NOTICE OF PROPOSED AMENDMENT 2025-01

Issue 01
Date of Issue: 08th April 2025

SUBJECT:

CAR-AGA based on EASA regulatory framework. PART ADR and PART TRG

REASON:

The UAE has planned to transform its regulation for Aerodromes, Heliports, Helidecks and Vertiports and adapt the EASA regulation framework to UAE environment.

Such transformation is not limited to regulation structure since it includes the formulation of new requirements, AMCs and GMs and grant new flexibilities.

The future CAR AGA will contain the following parts:

1.	PART-ADR: Regulation for Aerodrome Management, Operations and Design. (It will replace the current CAR ADR).
2.	PART-ACM: Regulations for Crisis Management, Business Continuity, Emergency Planning, Rescue and Firefighting and Fire Prevention (it will replace the current CAR PART XI).
3.	PART-VFI: Regulations for Management, Operations and Design of Heliports, Helidecks and Vertiports. (It will replace the current CAR HVD).
4.	PART-TRG : Common regulations for training and proficiency checks requirements.

On 31st December 2024, NPA 2024-12 was published to launch an external consultation that covered all the above-mentioned parts and contained the specific requirements for Aerodromes, Heliports, Helidecks and Vertiports, their Operators and Primary Accountable Organisation (PAO).

The consultation was closed on 31st March 2025. However, based on the request from concerned industry, the GCAA has decided to extend consultation for PART ADR and PART TRG. Although it has a different number (due to technical constraints), this NPA is a replication of PART ADR and PART TRG contained in the previous NPA 2024-12.

Public and other concerned organisations, in particular Aerodrome Operators are kindly requested to:

(a) Review the attached proposed regulation;
(b) Agree on the date of applicability to the proposed change set to 01 July 2026; and
(c) Submit their comments on the changes and date of applicability online through the GCAA website by **30 June 2025**.

Comments must be submitted through the GCAA Website – E-Publication – Notice of Proposed Amendment, using the Action of "Submit NPA Feedback Request."

Comments and Responses may be viewed in the Comments Response Document CRD pertaining to this NPA on the GCAA website.

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FOREWORD

PURPOSE

(a) Federal Decree Law No. 4 of 1996 and Federal Decree Law No. 20 of 1991, of the United Arab Emirates, establish the General Civil Aviation Authority (GCAA) as the Competent Authority with respect to civil aviation activities.

Note: A Competent Authority is any person or organization that has the legally delegated or invested authority, capacity, or power to perform a designated function. Similarly, once an authority is delegated to perform a certain act, only the Competent Authority is entitled to take accounts therefrom and no one else.

(b) The GCAA is required, under article 6 of the General Civil Aviation Law, to implement international agreements in the field of aviation, and by article 7 of the same Law, to promulgate policy for civil aviation and propose laws and regulations.

(c) As the Competent Authority, the GCAA has implemented CAR AGA for the provision of aerodrome design and operations in the areas for which the UAE has jurisdiction.

(d) The CAR AGA is divided into the following parts:

(1) PART-ADR

(2) PART-ACM

(3) PART- VFI

(4) PART - TRG

These regulations represent the minimum requirements designed to achieve an acceptable level of safety, considering the various nature of operations within the UAE. Aerodrome Operators are expected to meet or exceed the regulations.

(e) Where relevant the requirements of Subpart ADR.DEF, Subpart ADR.OR and Subpart ADR.OPS are applicable to land and water aerodromes.

INTERPRETATION

(a) The following terms have the corresponding meaning within this Regulation:

(1) May: The term 'may' is used in the GCAA regulation to give permission to do or not to do something.

(2) Shall: The term 'shall' is used in the GCAA regulation to impose an obligation or a requirement or a prohibition.

(3) Should:

(i) 'Should' in an AMC: the term 'should' is used to indicate any specification which is recognized as necessary in the interest of safety unless an alternative is accepted by the GCAA.

(ii) 'Should' in this publication other than an AMC (GM, safety alert, etc.): the term 'should' is used to indicate any specification which is recognized as desirable in the interest of safety.

(b) The terms 'Competent Authority', or 'GCAA', is used to refer to the General Civil Aviation Authority of the United Arab Emirates.

(c) The term 'Aerodrome Certificate', refers to any certificate issued to an aerodrome under this regulation.

(d) The term 'Landing Area Acceptance' refers to any landing area acceptance issued to any aerodrome under this regulation.

(e) The interpretation of some of the specifications used in this CAR requires the exercising of discretion, and /or the taking of a decision. In both the cases, the discretion or decision of the GCAA is binding.

IMPLEMENTING RULES (IR)

(a) Implementing Rules (IR) may be supported by one or more Acceptable Means of Compliance (AMC) and/or one or more Guidance Material (GM).

(b) Each IR is designed in a manner that it addresses one or more safety objective(s), through creating or limiting rights, creating or limiting duties and responsibilities.

(c) Compliance is mandatory, unless a waiver has been granted by the GCAA. IRs are binding in their entirety and used to specify a high and uniform level of safety and uniform conformity and compliance.

CERTIFICATION SPECIFICATION (CS)

(a) Certification Specifications (CS) are technical standards adopted by the GCAA. CS shall be used by the aerodrome operators to establish their compliance/non-compliance register.

(b) Should an aerodrome operator not meet the CS, they may propose an Equivalent Level of Safety (ELOS) that demonstrates how they meet the intent of the CS.

ACCEPTABLE MEANS OF COMPLIANCE (AMC)

(a) AMCs are standards (but not necessarily the only standards) adopted by the GCAA to illustrate means to establish compliance with the CARs. Compliance with AMC is mandatory unless an alternative means of compliance has been accepted by the GCAA.

(b) Where multiple AMC exist for an IR then all AMC are applicable unless specified otherwise.

(c) Aerodrome operators, if unable to comply with the AMC, must comply using other means that are accepted by the GCAA. Organisations may propose 'Alternative Means of Compliance' to an existing AMC, but this is subject to review and approval by the GCAA. Alternative Means of Compliance proposals shall be accompanied with evidence of the ability to meet the intent of the IR.

(d) Once an Alternative Means of Compliance is accepted by the GCAA, compliance therewith is mandatory.

GUIDANCE MATERIAL (GM)

GMs are non-binding explanatory and interpretation material on how to achieve the requirements contained in the IRs, CS and the AMCs. It contains information, including examples, to assist the user in the interpretation and application of the requirements.

DOCUMENTATION HIERARCHY

(a) UAE Civil Aviation Law

(1) Federal Decree Law No. 20 of 1991;

(2) Federal Decree Law No. 4 of 1996.

(b) UAE Civil Aviation Regulations;

(c) Other regulatory material published by the GCAA.

REFERENCES

(1) ICAO Annex 4 – Aeronautical Charts.

(2) ICAO Annex 10 - Aeronautical Telecommunications.

(3) ICAO Annex 14 – Aerodromes - Volume I - Aerodrome Design and Operation.

(4) ICAO Annex 14 – Aerodromes - Volume II – Heliports.

(5) ICAO Annex 15 - Aeronautical Information Services.

(6) ICAO Annex 19 – Safety Management.

(7) ICAO Manual on Ground Handling (Doc 10121).

(8) PANS-AERODROME (ICAO Doc 9981).

(9) ICAO Aerodrome Design Manual (Doc 9157).

(a) Part 1 – Runways.

(b) Part 2 – Taxiways, Aprons and Holding Bays.

(c) Part 3 – Pavements.

(d) Part 4 – Visual Aids.

(e) Part 5 – Electrical Systems.

(f) Part 6 – Frangibility.

(10) ICAO Airport Planning Manual (Doc 9184).

(a) Part 1 – Master Planning.

(b) Part 2 – Land Use and Environmental Control.

(c) Part 3 – Guidelines for Consultant/Construction Services.

(11) ICAO Airport Services Manual (Doc 9137).

(a) Part 1 – Rescue and Fire Fighting.

(b) Part 2 – Pavement Surface Conditions.

(c) Part 3 – Bird Control and Reduction.

(d) Part 5 - Removal of Disabled Aircraft.

(e) Part 6 – Control of Obstacles.

(f) Part 7 – Airport Emergency Planning.

(g) Part 8 – Airport Operational Services.

(h) Part 9 – Airport Maintenance Practices.

(12) ICAO Manual of All-Weather Operations (Doc 9365).

(13) ICAO Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

(14) ICAO Manual on Certification of Aerodromes (Doc 9774).

(15) ICAO Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643).

(16) ICAO Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332).

(17) ICAO Aeronautical Information Services Manual (Doc 8126).

(18) ICAO Manual of Advanced Surface Movement Guidance and Control Systems (A-SMGCS) (Doc 9830).

(19) ICAO World Geodetic System – 1984 (WGS-84) Manual (Doc 9674).

(20) UAE Civil Aviation Law, Federal Law No. 20.

(21) Civil Aviation Regulation (CAR) Part I – Definitions.

(22) Civil Aviation Regulation (CAR) ASP – Part OCO.

(23) Civil Aviation Regulation (CAR) OCR .

(24) Civil Aviation Regulation (CAR) SMS.

(25) Civil Aviation Regulation (CAR) MET.

(26) Easy Access Rules for Aerodromes (Regulation (EU) No 139/2014)

RECORD OF AMENDMENTS

ISSUE	DATE OF ISSUE	DATE OF APPLICABILITY
Initial Issue - 1 January 2002	1 January 2002	1 January 2002
Issue 02	December 2010	December 2010
Issue 03	February 2014	February 2014
Issue 04	August 2014	August 2014
Issue 05	April 2016	April 2016
Issue 05 Revision 1	01 May 2016	01 May 2016
Issue 05 Revision 2	15 February 2017	15 February 2017
Issue 06	01 March 2019	01 March 2019
Issue 07	01 September 2019	01 September 2019
Issue 08	08 February 2020	01 March 2020
Issue 09	12 October 2020	12 October 2020
Issue 10	08 November 2020	08 November 2020
Issue 11	10 January 2023	10 January 2023
Issue 11 (Corrected)	31 January 2023	31 January 2023
CAR AGA Issue ~~12~~ 01 (Transition to EASA Format)		

6.0 SUMMARY OF CHANGES IN THIS ISSUE

Significant changes are as follows:

(a) Consolidation of the following stand-alone AMCs which are incorporated in this CAR ADR.

(1) Acceptable Means of Compliance (AMC) 30 – The Issue and Verification of an Aerodrome Certificate;

(2) Acceptable Means of Compliance (AMC) 32 – The Assessment of Runway Surface Friction Characteristics;

(3) Acceptable Means of Compliance (AMC) 36 – Runway and Movement Area Inspections;

(4) Acceptable Means of Compliance (AMC) 43 – Foreign Object Debris;

(5) Acceptable Means of Compliance (AMC) 44 – Low Visibility Procedures (LVP);

(6) Acceptable Means of Compliance (AMC) 59 – Aerodrome Projects;

(7) Acceptable Means of Compliance (AMC) 72 - Aircraft Landing Areas: Private Use (not air service).

(b) Changes to the format of the existing CAR ADR to incorporate CS, IR, AMC and GM;

(c) Changes to the format of the existing CAR ADR to incorporate Subpart. OR, Subpart. OPS and Subpart DSN-CS and Subpart DSN-WCS.

(d) Changes to the aerodrome manual format.

PART AERODROMES (ADR)

SUBPART- DEFINITIONS (ADR.DEF)

ADR.DEF.A.001 Applicability

The definitions within this part shall be applicable within CAR AGA.

ADR.DEF.A.005 Definitions

'Accepted/Acceptable'

Not objected to by the Competent Authority as suitable for the purpose intended.

'Accuracy'

A degree of conformance between the estimated or measured value and the true value.

'Accepted Landing Area'

An aerodrome or heliport whose operator has been granted a Landing Area Acceptance.

'Advanced Surface Movement Guidance and Control System (A-SMGCS)'

A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required safety.

'Aerodrome'

A defined area (including any buildings, installations and equipment) on land or water or on a fixed offshore or floating structure intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. Includes on-shore and off-shore heliports, helidecks and vertiports.

Note: When reference is made to heliports, helidecks and vertiports, it must be understood by the reader that heliports, helidecks and vertiports are also included in the definition of aerodrome.

'Aerodrome beacon'

An aeronautical beacon used to indicate the location of an aerodrome from the air.

'Aerodrome Certificate'

A certificate issued by the Competent Authority under Civil Aviation Regulation (CAR ADR) for the operation of an aerodrome.

'Aerodrome Certificate Verification Audit'

An inspection of the aerodrome facilities, equipment and services and audit of the safety manuals and Compliance Statements for certification conducted prior to the issue of an Aerodrome Certificate.

'Aerodrome Elevation'

The elevation of the highest point of the landing area.

'Aerodrome Facilities and Equipment'

Facilities and equipment, apparatus, appurtenance, software or accessory, that is used or intended to be used to contribute to the operation of aircraft at an aerodrome.

'Aerodrome Identification Sign' means a sign placed on an aerodrome to aid in identifying the aerodrome from air

'Aerodrome Land Reserves'

Land currently adjacent to an aerodrome that needs securing and protecting to realise the final airports master design, e.g. new terminals, runways, hangars etc.

'Aerodrome Manual'

The manual that forms part of the application for an Aerodrome Certificate or Landing Area Acceptance and is maintained pursuant to these regulations.

'Aerodrome Mapping Data (AMD)'

Data collected for the purpose of compiling aerodrome mapping information for aeronautical uses.

Note: Aerodrome mapping data are collected for purposes that include the improvement of the user's situational awareness, surface navigation operations, training, charting and planning.

'Aerodrome Mapping Database (AMDB)'

A collection of aerodrome mapping data organized and arranged as a structured data set.

'Aerodrome Operator'

In relation to a certified aerodrome, the Aerodrome Certificate holder or in relation to an accepted landing area, the Landing Area Acceptance holder.

'Aerodrome Post Holder'

Those positions required as part of Aerodrome who are subject to acceptance by the GCAA.

'Aerodrome Project'

Projects that involves change to the aerodrome infrastructure including the following:

(a) Developments: Major upgrade/refurbishment of existing infrastructure which could affect operations during work-in-progress and new infrastructure including but not limited to buildings, taxiways, aprons, visual aids or navigational aids;

(b) Changes to existing Infrastructure: Changes to existing infrastructure or physical characteristics including but not limited to reconfiguration of stands or changes to the runway;

(c) Significant maintenance of infrastructure that may involve downgrade or temporary closure, for a duration of time that may have an impact on the safety, regularity and efficiency of aircraft operations.

'Aerodrome Reference Point'

The designated geographical location of an aerodrome.

'Aerodrome Traffic Density'

The number of movements in the mean busy hour and is the arithmetic mean over the year of the number of movements in the daily busiest hour. Movement is either a take-off or a landing:

(a) Light. Where the number of movements in the mean busy hour is not greater than 15 per runway or typically less than 20 total aerodrome movements.

(b) Medium. Where the number of movements in the mean busy hour is of the order of 16 to 25 per runway or typically between 20 to 35 total aerodrome movements.

(c) Heavy. Where the number of movements in the mean busy hour is of the order of 26 or more per runway or typically more than 35 total aerodrome movements.

'Aeronautical Beacon'

An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.

'Aeronautical Ground Light'

Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

'Aeronautical Information Service (AIS)'

A service established within the defined area of coverage responsible for the provision of aeronautical information/data necessary for the safety, regularity and efficiency of air navigation.

'Aeronautical Study'

A study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.

'Aeroplane'

A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight;

'Aeroplane Reference Field Length'

The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight

manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

'Aircraft'

Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface. This comprises fixed-wing and variable-wing aircraft as well as balloons, when used for civil purposes.

Aircraft classification rating (ACR)

A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

Note— The aircraft classification rating is calculated with respect to the centre of gravity (CG) position which yields the critical loading on the critical gear. Normally the aftmost CG position appropriate to the maximum gross apron (ramp) mass is used to calculate the ACR. In exceptional cases the forwardmost CG position may result in the nose gear loading being more critical.

'Aircraft stand'

A designated area on an apron intended to be used for parking an aircraft.

'Air Service'

An air service open to the public and performed by aircraft for the public transport of passengers, mail or cargo for remuneration or hire.

'Air Traffic Services Unit'

A generic term meaning variously, air traffic control unit, aerodrome flight information services unit, flight information centre or air traffic services reporting office.

'Alternative Means of Compliance'

Alternative means of compliance are those that propose an alternative to an existing Acceptable Means of Compliance (AMC) or those that propose new means to establish compliance with Civil Aviation Regulation for which no associated AMC have been adopted by the Competent Authority and is subject to acceptance by the GCAA.

'Appropriate Authority'

The concerned authorities of the respective Emirate.

'Aircraft Stand Taxilane'

A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

'Apron'

A defined area, on a land aerodrome intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking, or maintenance.

'Apron Management Service'

A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

'Arresting system'

A system designed to decelerate an aeroplane overrunning the runway.

'Apron Service Road'

A road located on or adjacent to an apron, intended for the exclusive use of vehicles.

'Apron Taxiway'

A portion of a taxiway system located on an apron and intended to provide a through taxi-route across the apron.

'Autonomous runway incursion warning system (ARIWS)'

A system which provides autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or a vehicle operator.

'Authority Publication'

Any applicable document published by the GCAA including, but not limited to Civil Aviation Regulations (CARs), Safety decisions, Safety Alerts, Standalone GM, Standalone AMC, Standards, Informational Bulletins, or any other applicable document published as an e-Publication as part of the GCAA website.

'Balked landing'

A landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H).

'Barrette'

Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

'Calendar'

A discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 1910 *ISO Standard 19108, Geographic information; Temporal schema 2. 8).

'Certification Specifications'

Technical standards adopted by the Competent Authority indicating means to show compliance with the CARs and which can be used by organisations for the purpose of certification.

'Certified Aerodrome'

An aerodrome whose operator has been granted an Aerodrome Certificate.

'Clearway'

Means a defined rectangular area on the ground or water under the control of the aerodrome operator selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

'Compatibility Study'

Study undertaken by the aerodrome operator to address the impact of introducing an aeroplane type/model new to the aerodrome. A compatibility study may include one or several safety assessments.

'Compliance Statement'

A statement by the Aerodrome Operator to the GCAA verifying compliance with the relevant UAE Civil Aviation Regulations.

'Contracted Activity'

An activity or task that is required by the scope of the aerodrome operator that is performed by another organisation.

'Critical seaplane'

The type of aeroplane which is the most demanding for the relevant elements of the physical infrastructure and the facilities for which the water aerodrome is intended.

'Cyclic redundancy check (CRC)'

A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

'Critical Area'

An area of defined dimensions extending about the ground equipment of a precision instrument approach within which the presence of vehicles or aircraft will cause unacceptable disturbance of the guidance signals.

'Data Accuracy'

A degree of conformance between the estimated or measured value and the true value.

'Data Integrity' (assurance level)

A degree of assurance that an aeronautical data and its value has not been lost or altered since the origination or authorized amendment.

'Data Quality'

A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity (or equivalent assurance level), traceability, timeliness, completeness and format.

'Datum'

Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104).

'Delethalisation'

Below ground ramping to buried vertical face of construction designed to reduce risk of damage to aircraft running on cleared and graded area of strip.

'Declared distances'

(a) 'Take-off run available (TORA)' the length of runway declared available and suitable for the ground run of an aeroplane taking off.

(b) 'Take-off distance available (TODA)' the length of the take-off run available plus the length of the clearway, if provided.

(c) 'Accelerate-stop distance available (ASDA)' the length of the take-off run available plus the length of the stopway, if provided.

(d) 'Landing distance available (LDA)' the length of runway which is declared available and suitable for the ground run of an aeroplane landing.

'Dependent Parallel Approaches'

Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

'Displaced Threshold'

A threshold not located at the extremity of a runway.

'Effective Intensity'

That the intensity of a flashing light is equal to the intensity of a fixed light of the same colour which will produce the same visual range under identical conditions of observation.

'Ellipsoid Height (Geodic height)'

The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

'Fixed Light'

A light having constant luminous intensity when observed from a fixed point.

'Fixed platform (dock)'

A platform extending from the shore or fixed land structure, on water and supported by pillars to hold it in position, intended to align alongside seaplanes for the purposes of embarkation and disembarkation of passengers, loading and unloading of cargo, or refuelling or parking of seaplanes.

'Final approach and take-off area (FATO)'

A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by helicopters operated in performance class 1, the defined area includes the rejected take-off area available.

'Foreign object debris (FOD)'

An inanimate object within the airside boundary which has no operational or aeronautical function and which has the potential to be a hazard to aircraft operations.

'Frangibility'

The ability of an object to retain its structural integrity and stiffness up to a specified maximum load but when subject to a load greater than specified or struck by an aircraft will break, distort or yield in a manner designed to present minimum hazard to an aircraft.

'Frangible object'

An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

Note: Guidance on design for frangibility is contained in the ICAO Aerodrome Design Manual (Doc 9157) Part 6.

'Gangway'

A movable walkway where people board and disembark such as platforms, piers or shorelines.

'Geodetic Datum'

A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

'Geoid'

The equipotential surface in the gravity field of the Earth which coincides with the undisturbed Mean Sea Level (MSL) extended continuously through the continents.

Note: The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

'Geoid Undulation'

The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note: In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

'Grading'

Levelling of the ground surface to meet the applicable slope requirements and so prepared or constructed as to minimise hazards arising from differences in load bearing capacity to aircraft which a runway or taxiway is intended to serve, in the event of an aircraft excursion off the runway or taxiway.

'Gregorian calendar'

Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108).

Note – In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

'Hazard beacon'

An aeronautical beacon used to designate a danger to air navigation.

'Holding bay'

A defined area where aircraft can be held, or bypassed to facilitate efficient surface movement of aircraft.

'Hot Spot'

A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

'Human Factors principles'

Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

'Human Performance'

Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

'Identification Beacon'

An aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.

'Independent parallel approaches'

Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.

'Independent parallel departures'

Simultaneous departures from parallel or near-parallel instrument runways.

'Instrument runway'

One of the following types of runways intended for the operation of aircraft using instrument approach procedures:

(a) 'Non-precision approach runway': a runway served by visual aids and non-visual aid (s), intended for landing operations following an instrument approach operation type A and a visibility not less than 1000 m.

(b) 'Precision approach runway, category I': A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.

(c) 'Precision approach runway, category II': A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m.

(d) 'Precision approach runway, category III': A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 30 m (100 ft), or no decision height and a runway visual range less than 300 m, or no runway visual range limitations.

Note 1.— Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.

Note 2.— Refer to Annex 6 — Operation of Aircraft for instrument approach operation types.

'Inland waterways'

Water bodies like rivers, lakes or other stretches of water, whether linked to the sea or landlocked, which by natural or man-made features are suitable for navigation. In the case of river estuary, the boundary between sea and inland waterways is the established baseline in accordance with international law.

'Integrity (aeronautical data)'

A degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorised amendment.

'Integrity classification'(aeronautical data)

Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data is classified as:

(a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

(b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

(c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

'Intermediate Holding Position'

A designated position intended for traffic control at which taxiing aircraft and vehicles should stop and hold until further cleared to proceed when so instructed by the appropriate air traffic control unit.

'Isolated Aircraft Parking Position'

An area suitable for the parking of an aircraft which is known or suspected to be the subject of unlawful interference, or for other reasons needs isolation from normal aerodrome activities.

'International Aerodrome'

Any aerodrome designated by the authority for the arrival and departure of international air traffic, and where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

'Landing Area'

That part of a movement area intended for the landing or take-off of aircraft.

'Landing Area Acceptance'

An acceptance issued by the GCAA for the operation of an aerodrome.

'Landing Direction Indicator'

A device to indicate visually the direction currently designated for landing and for take-off.

'Laser-beam Critical Flight Zone (LCFZ)'

Airspace in the proximity of an aerodrome but beyond the LFFZ where the irradiance is restricted to a level unlikely to cause glare effects.

'Laser-beam Free Flight Zone (LFFZ)'

Airspace in the immediate proximity of the aerodrome where the irradiance is restricted to a level unlikely to cause any visual disruption.

‘Laser-beam sensitive flight zone (LSFZ)’

Airspace outside, and not necessarily contiguous with, the LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flash-blindness or after-image effects.

‘Lighting system reliability’

The probability that the complete installation operates within the specified tolerances and that the system is operationally usable.

‘Low Visibility Conditions (LVC)’

The meteorological conditions requiring approaches and landings in Category II and Category III, take offs in RVR less than 550 metres or for surface movements in meteorological conditions not permitting ATS to be carried out with visual reference.

‘Low Visibility Procedures (LVP)’

The measures required to support safe operations at an aerodrome in Low Visibility Conditions (LVC).

‘Low water level’

The average low tide level during that month of the year when levels are lowest or, in the case of large water bodies, the average level of low water springs or lower low waters, depending on the water currents.

‘Manoeuvring area’

That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

‘Marker’

An object displayed above ground level in order to indicate an obstacle or delineate a boundary.

‘Marking’

A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

‘Mooring’

A fixed permanent installation on the water surface used to secure seaplanes. The seaplane may be moored to a floating buoy, a pier, platforms, etc.

‘Mooring buoy’

A buoy connected by chain or cable to a permanent unmovable anchor sunk deeply into the bottom of a body of water.

‘Movement Area’

That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

'Near-parallel runways'

Non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.

'Non-instrument runway'

A runway intended for the operation of aircraft using visual approach Procedures or an instrument approach procedure to a point beyond which the approach may continue in visual meteorological conditions.

'Normal flight Zone'(NFZ)

Airspace not defined as LFFZ, LCFZ or LSFZ but which must be protected from laser radiation capable of causing biological damage to the eye.

'Obstacle'

Fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

(a) are located on an area intended for the surface movement of aircraft; or

(b) extend above a defined surface intended to protect aircraft in flight; or

(c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

'Obstacle-free zone (OFZ)'

The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangible mounted one required for air navigation purposes.

'Obstacle limitation surface'

A surface that defines the limits to which objects may project into the airspace.

'Obstacle protection surface'

A surface established for visual approach slope indicator system above which objects or extensions of existing objects shall not be permitted except when, in the opinion of the Appropriate Authority, the new object or extension would be shielded by an existing immovable object.

'Operator'

Any legal or natural person, operating or proposing to operate one or more aircraft or one or more aerodromes.

'Outer Main Gear Wheel Span (OMGWS)'

The distance between the outside edges of the main gear wheels.

'Orthometric Height'

Height of a point related to the geoid, generally presented as an MSL elevation.

'Paved Runway'

A runway with a hard surface that is made up of engineered and manufactured materials bound together so it is durable and either flexible or rigid.

'Pavement Classification Rating (PCR)'

A number expressing the bearing strength of a pavement.

'Periodic Surveillance Audit'

An audit conducted periodically at the discretion of the GCAA confirming on-going compliance with the Civil Aviation Regulations.

'Point-in-space Approach (PinS)'

An approach based on Global Navigation Satellite System (GNSS) and is an approach procedure designed for helicopter only. It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.

'Point-in-space (PinS) Visual Segment'

The segment of a helicopter PinS approach procedure from the MAPt to the landing location for a PinS "proceed visually" procedure. This visual segment connects the Point-in-space (PinS) to the landing location.

Note: The procedure design criteria for a PinS approach and the detailed design requirements for a visual segment are established in the Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168).

'Precision Approach Runway',

see 'instrument runway'.

'Primary runway(s)'

Runway(s) used in preference to others whenever conditions permit.

'Protected area'

An area which is protected from large water currents. The structure providing protection can be natural or constructed.

'Protected flight zone'

Airspace specifically designated to mitigate the hazardous effects of laser radiation.

'Road'

An established surface route on the movement area meant for the exclusive use of vehicles.

'Road-holding position'

A designated position at which vehicles may be required to hold.

'Runway'

A defined rectangular area on a land aerodrome prepared for the landing and take- off of aircraft.

'Runway condition assessment matrix' (RCAM)

A matrix allowing the assessment of the runway condition code, using associated procedures, from a set of observed runway surface condition(s) and pilot report of braking action.

'Runway condition code'(RWYCC)

A number describing the runway surface condition to be used in the runway condition report.

Note— The purpose of the runway condition code is to permit an operational aeroplane performance calculation by the flight crew. Procedures for the determination of the runway condition code –are described in the PANS-Aerodromes (Doc 9981).

'Runway condition report'(RCR)

A comprehensive standardized report relating to runway surface condition(s) and its effect on the Aeroplane landing and take-off performance.

'Runway end safety area (RESA)'

An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

'Runway guard lights'

A light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

'Runway-holding position'

A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles should stop and hold, unless otherwise authorised by the aerodrome control tower.

Note. — In radiotelephony phraseologies, the expression "holding point" is used to designate the runway-holding position.

'Runway Starter Extension'

A portion of a runway prior to the threshold used for take-off only and not for use in the opposite direction, with the exception of back-track manoeuvres.

'Runway strip'

A defined area including the runway and stopway, if provided, intended:

(a) to reduce the risk of damage to aircraft running off a runway; and

(b) to protect aircraft flying over it during take-off or landing operations.

'Runway surface condition(s)'

A description of the condition(s) of the runway surface used in the runway condition report which establishes the basis for the determination of the runway condition code for aeroplane performance purposes.

Note 1.— The runway surface conditions used in the runway condition report establish the performance requirements between the aerodrome operator, aeroplane manufacturer and aeroplane operator.

Note 2.— Procedures on determining runway surface conditions are available in the PANS-Aerodromes (Doc 9981).

(a) Dry runway. A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used.

(b) Wet runway. The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use.

(c) Slippery wet runway. A wet runway where the surface friction characteristics of a significant portion of the runway have been determined to be degraded.

(d) Contaminated runway. A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors.

(e) Runway surface condition descriptors. Standing water. Water of depth greater than 3 mm.

Note 1: Running water of depth greater than 3 mm is reported as standing water by convention.

Note 2: For reasons of simplicity and better comprehension in filing the SNOWTAM, winter condition descriptors are not listed under definitions as they are not applicable in the UAE, being a wet and dry only region.

Note3: Procedures on determination of contaminant coverage on runway are available in the PANS-Aerodromes (Doc 9981).

'Runway Turn Pad'

A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.

'Runway Type'

Instrument runway or non-instrument runway.

'Runway visual range (RVR)'

The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

'Safety Management System (SMS)'

A systematic approach to managing safety including the necessary organizational structure, accountabilities, policies and procedures.

'Segregated Parallel Operations'

Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

'Service Fees'

Those fees on the General Civil Aviation Authority website, as varied from time to time and in respect to a service delivered by the GCAA, which are required to be paid to the General Civil Aviation Authority pursuant to Federal Government decisions.

'Sensitive area'

an area extending beyond the Critical Area where the parking and/or movement of aircraft or vehicles will affect the guidance signal to the extent that it may be rendered unacceptable to aircraft using the signal.

'Shoulder'

An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

'Sign':

a) Fixed message sign means a sign presenting only one message;

b) Variable message sign means a sign capable of presenting several predetermined messages or no message, as applicable.

'Signal area'

Area on an aerodrome used for the display of ground signals.

'SNOWTAM'

A special series NOTAM given in a standard format, which provides a surface condition report notifying the presence or cessation of hazardous conditions due to standing water on the movement area;

'Station declination'

An alignment variation between the zero-degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

'Stopway'

A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

'Surface Movement Guidance and Control System (SMGCS)'

A system providing routing, guidance and surveillance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required safety.

Note: Reference to SMGCS also includes A-SMGCS.

'Surface Friction'

The resistance offered to the movement of one body past a surface with which it is in contact.

'Switch-over time (light)'

The time required for the actual intensity of a light measured in a given direction to fall from 50 per cent and recover to 50 per cent during a power supply changeover, when the light is being operated at intensities of 25 per cent or above.

'Take-off runway'

A runway intended for take-off only.

'Taxiway'

A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

(a) Aircraft stand taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

(b) Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi-route across the apron.

(c) Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

'Taxi channel'

A defined path on a water aerodrome, intended for the use of taxing seaplanes

'Taxiway Intersection'

A junction of two or more taxiways.

'Taxiway Strip'

An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

'Technical inspection'

An inspection of the aerodrome infrastructure, OLS aerodrome equipment, and facilities.

'Threshold'

The beginning of that portion of the runway usable for landing.

'Touchdown zone'

The portion of a runway, beyond the threshold, where landing aeroplanes are intended to first contact the runway.

'Type A instrument approach operation'

An instrument approach operation with a minimum descent height or decision height at or above 75 m (250 ft);

'Type B instrument approach operation'

An instrument approach operation with a decision height below 75 m (250 ft) categorised as follows:

(a) Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;

(b) and Category II (CAT II): a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft) a runway visual range not less than 300 m;

(c) Category III (CAT III): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range less than 300 m or no runway visual range limitations.

'Unserviceable area'

Part of the Movement Area that is unfit and unavailable for use by aircraft.

'Usability factor'

The percentage of time during which the use of a runway or system of runways is not restricted because of the crosswind component.

Note. — Crosswind component means the surface wind component at right angles to the runway centre line.

'Visual aids'

Indicators and signalling devices, markings, lights, signs and markers or combinations thereof.

'Visual Approach Slope Indicator System'

A system of lights arranged to provide visual descent guidance information during the approach to a runway.

'Waterways'

A river, canal or other waterbody serving as a route or way of travel or transport.

'Water aerodrome'

Means a defined area, primarily on water, intended to be used either wholly or in part for the arrival, departure and movement of seaplanes, and any associated building and equipment on ground or water.

'Water aerodrome manoeuvring area'

Parts of a water aerodrome, other than a platform, that is intended to be used for the take-off and landing of aircraft and for the movement of aircraft associated with take-off and landing.

'Water aerodrome movement area'

The part of an aerodrome to be used for take-off, landing and taxiing of seaplanes, consisting of the manoeuvring area and platforms.

'Visual aids'

Indicators and signalling devices, markings, lights, signs and markers or combinations thereof.

SUBPART- ORGANISATIONAL REQUIREMENTS (ADR.OR)

SECTION A — GENERAL REQUIREMENTS (ADR.OR.A)

ADR.OR.A.005 Scope

(a) An aerodrome operator shall not provide a service to civil aviation, within the UAE except under the authority of, and in accordance with the provisions of, a valid aerodrome certificate or Landing Area Acceptance (LAA), issued by the GCAA under this regulation.

(b) This regulation establishes the common requirements, unless specifically mentioned, to be followed by an aerodrome operator with respect to its aerodrome certification or Landing Area Acceptance, management, manuals and other responsibilities.

ADR.OR.A.010 Competent Authority

The UAE General Civil Aviation Authority (GCAA) is the designated competent authority responsible for:

(a) certification and oversight of aerodromes and its operators, on land or water;

(b) acceptance and oversight of landing areas and its operators, on land or water.

ADR.OR.A.015 Means of compliance

(a) The aerodrome operator shall comply with the scope and conditions that are endorsed in the aerodrome certificate or landing area acceptance.

(b) The aerodrome operator shall provide all the relevant evidence to demonstrate compliance with the applicable requirements of this regulation at the request of the GCAA.

(c) When The aerodrome operator wishes to use an alternative means of compliance to the Acceptable Means of Compliance (AMC), they shall, prior to implementing the alternative means of compliance, provide the GCAA with a full description of the alternative means of compliance.

The description shall include a clear justification for the need for alternative, any revisions to manuals or procedures that may be relevant, as well as an assessment demonstrating that the implementing rules are met.

(d) The aerodrome operator shall implement alternative means of compliance subject to prior approval by the GCAA and only upon receipt of such notification.

GM1 ADR.OR.A.015 Means of compliance

The GCAA will evaluate the alternative means of compliance proposed by an aerodrome operator, by analysing the documentation provided and, if considered necessary, conducting a technical inspection of the aerodrome.

ADR.OR.A.020 Demonstration of compliance

(a) The aerodrome operator shall:

(1) perform and document all actions, inspections, tests, safety assessments or exercises necessary, and shall demonstrate to the GCAA:

(i) compliance with the requirements of this CAR, any safety decision, as appropriate;

(ii) that the aerodrome, as well as its obstacle limitation and protection surface and other areas associated with the aerodrome, have no features or characteristics making it unsafe for operation.

(2) provide to the GCAA the means by which compliance has been demonstrated; and

(3) declare to the GCAA the status of compliance through their compliance / non-compliance register.

(b) Relevant design information, including drawings, inspection, test and other relevant reports, shall be held and kept by the aerodrome operator at the disposal of the GCAA, in accordance with the provisions of ADR.OR.G.035 - Record keeping, and provided on request to the GCAA.

(c) The methodologies and specifications contained in the ICAO Airport Design Manuals and ICAO Airport Service Manuals shall be considered to represent an Acceptable Means of Compliance unless otherwise indicated by the GCAA.

AMC1.OR.A.020 Demonstration of compliance

GENERAL- USE OF THIRD PARTIES TO DEMONSTRATE COMPLIANCE

While performing the necessary actions, inspections, tests, safety assessments, or exercises necessary to demonstrate compliance, the aerodrome operator may also use contracted third parties. In any case, the declaration of compliance and responsibility remains with the aerodrome operator.

ADR.OR.A.025 Personnel requirements- Certified aerodromes

(a) An aerodrome operator prior to the grant of an aerodrome certificate and on an on-going basis shall engage, employ or contract:

(1) sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the aerodrome in accordance with the applicable requirements and the Aerodrome Operator's training programme; and

(2) sufficient number of supervisors to defined duties and responsibilities, considering the structure of the organisation.

(b) The aerodrome operator shall nominate an Accountable Manager, acceptable to the GCAA , who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. The Accountable Manager shall be responsible for establishing and maintaining an effective management system. Therefore, the Accountable Manager shall:

(1) have full control of the resources, final authority over operations under the certificate/approval of the organisation and ultimate responsibility and accountability for the establishment, implementation and maintenance of management systems, policies, and resolution of all safety issues;

(2) have the final responsibility for all safety issues;

(3) ensure that all necessary resources are available to operate the aerodrome in accordance with the applicable requirements and the aerodrome manual;

(4) ensure that if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations at the aerodrome is implemented;

(5) ensure the establishment , implementation , and promotion of the safety policy;

(6) ensure compliance with relevant applicable requirements, the organisation's safety management system, as well as its quality assurance programme;

(7) ensure the establishment of a just culture which encourages safety reporting;

(8) ensure the establishment, implementation and maintenance of the organisation's competence to learn from the analysis of data collected through its safety reporting system and others Safety Data Collection and Processes Systems (SDCPS) in place; and establishment of safety objectives and safety targets.

(c) The aerodrome operator, shall nominate the following Post Holders, acceptable to the GCAA, who are responsible for the management and supervision of safety critical aspects as below:

(1) operations of the aerodrome – aerodrome operations Post Holder;

(2) maintenance of the aerodrome- aerodrome maintenance Post Holder;

(3) aerodrome quality assurance- aerodrome quality Post Holder;

(4) safety management system- aerodrome safety Post Holder; and

(5) rescue and firefighting services - aerodrome rescue and firefighting service Post Holder.

(d) The Post Holders shall have direct access to the Accountable Manager and to appropriate management for safety matters and shall be responsible to the accountable manager.

(e) The aerodrome operator shall ensure that personnel involved in the operation, maintenance and management of the aerodrome are adequately trained in accordance with the training programme.

(f) The aerodrome operator shall determine the number of personnel needed to carry out planned tasks.

(g) The Aerodrome Operator shall update its aerodrome manual including the organisational structure with respect to the accepted aerodrome Post Holders. The organizational structure of the aerodrome operator shall be acceptable to the GCAA.

GM1 ADR.OR.A.025(a)(1) Personnel requirements- Certified Aerodromes

QUALIFIED PERSONNEL

(a) The term 'qualified' denotes fitness or fit for the purpose. This may be achieved through fulfilment of the necessary conditions such as completion of required training, or acquisition of a diploma or degree, or through the gaining of suitable experience. It also includes the ability, capacity, knowledge or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege or status.

(b) Certain posts may, by nature, be associated with the possession of certain qualifications in a specific field (e.g. rescue and firefighting, civil, mechanical or electrical engineering, wildlife biology, etc.). In such cases, the person occupying such a post is expected to possess the necessary qualifications.

AMC1 ADR.OR.A.025(b) Personnel requirements- Certified Aerodromes

ACCOUNTABLE MANAGER– GENERAL REQUIREMENTS

(a) Accountable Manager

(1) The Accountable Manager should have:

(i) knowledge and understanding of aerodrome regulations;

(ii) understanding of the requirements for competence of aerodrome Post Holders so as to ensure that competent postholders are employed;

(iii) knowledge and understanding of safety, quality management systems related principles and practices, and how these are applied within the organisation;

(iv) knowledge of the role of the accountable manager; and

(v) knowledge and understanding of the key issues of risk management within the aerodrome.

(b) Accountable Manager— Delegation of responsibilities

(1) The technical knowledge and understanding expected by an Accountable Manager are high level, with particular reference to his/her own role in ensuring that standards are maintained;

(2) Responsibilities of the Accountable Manager may be delegated. This delegation should be formalised and clearly defined. However, the accountability ultimately remains with the Accountable Manager.

AMC1 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

POST HOLDERS – ACCEPTANCE

(a) The GCAA's acceptance of nominated Post Holders is based on the applicable assessment criteria as established in AMC7.ADR.OR. A.025(c)-Personnel requirements, and the applicant's demonstration of knowledge of the applicable regulations and an understanding of the proposed position.

(b) Nomination of the Post Holder is the responsibility of the aerodrome operator.

(c) Cases for interviews with nominated aerodrome Post Holders , for acceptance by the GCAA, include the following:

(1) start of operations before issuing the aerodrome certificate; or

(2) change of aerodrome Post Holders.

AMC2 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

POST HOLDERS – CONTINUOUS AVAILABILITY

(a) The aerodrome operator should ensure the roles held by accepted post holders are continually occupied by appropriate persons.

(b) A vacancy, or potential vacancy, of any post holder positions should be notified to the GCAA immediately.

(c) Initial notification of a vacancy should, within 5 working days, be followed by an action plan via the management of change process, to manage and replace the vacant position.

(d) The roles, authority, responsibilities and accountabilities of the person(s) occupying positions as mentioned in ADR.OR.A.25(b) and (c)- Personnel requirement, should be reflected in their respective job description.

(e) A person should not be permitted to hold more than one of the positions mentioned under ADR.OR. A.025(b) and (c)- Personnel requirement, without the acceptance of the GCAA.

(f) The GCAA may, at any time, restrict, suspend, or revoke, the acceptance of a Post Holder.

AMC3 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

NOMINATED POST HOLDERS

(a) Aerodrome safety Post Holder should:

(1) have appropriate Safety Management System knowledge and experience;

(2) be responsible for the overall performance of the Safety Management System, including implementation, maintenance, documentation, performance, effectiveness and oversight of the organisation in accordance with these regulations and CAR SMS;

(3) be the principal communicator with the GCAA in relation to Safety Management System;

(4) be directly responsible to the Accountable Manager on the performance of SMS and on any need for improvement;

(5) ensure safety promotion throughout the organisation.

(b) Aerodrome operations Post Holder:

(1) should be responsible for ensuring that the aerodrome and its operations comply with the requirements of CAR AGA;

(2) should be the principal communicator with the GCAA in relation to aerodrome operational matters;

(3) the Aerodrome operations Post Holder should:

(i) ensure that aerodrome certification requirements are met, and that the aerodrome operates in accordance with certificate conditions and regulatory requirements;

(ii) be responsible for the management of the operational services of the aerodrome and for day-to-day aerodrome operations;

(iii) monitor airside planning and development for compliance;

(iv) analyse audit findings and inspections and initiate appropriate actions pertaining to their area of operations;

(v) use feedback from audits and inspections to recommend appropriate changes to airside safety management procedures and ensure implementation;

(vi) have an understanding of the certification requirement and status of the aerodrome manual;

(c) Aerodrome maintenance Post Holder:

(1) should be responsible for ensuring that the aerodrome's maintenance programmes for safety critical infrastructure comply with the requirements of these regulations;

(2) should be the principal communicator with the GCAA in relation to aerodrome maintenance;

(3) the aerodrome maintenance Post Holder should:

(i) ensure that aerodrome meet the certification requirements , and that the aerodrome facilities are accurately reported (Aerodrome Manual/AIP) and in accordance with the regulatory requirements;

(ii) ensure aerodrome facilities are compatible with sizes, types and frequency of aircraft in accordance with organisation's and technical requirements;

(iii) ensure that maintenance policies, procedures and training fulfil the aims of the aerodrome and meet regulatory requirements;

(iv) have an understanding of regulatory requirements specific to visual aids (markings, lighting, signs), electrical systems and pavements;

(v) have an understanding of requirement for corrective and preventive maintenance programme;

(vi) understanding of role as related to aerodrome reporting systems to include hazard identification, defect identification and reporting of safety critical information to the air traffic service unit.

(d) Aerodrome Rescue Firefighting Service Post Holder should:

(1) have appropriate skill, knowledge and experience based on the scale of aerodrome rescue and firefighting operations;

(2) be responsible for establishing and effectively managing all aspects of rescue and firefighting services, facilities and equipment as per the requirements of this CAR;

(3) should be the principal communicator with the GCAA in relation to aerodrome rescue and firefighting services;

(4) ensure that aerodrome certificate requirements are met, and that the aerodrome operates in accordance with the regulatory requirements in the provision of RFFS;

(5) ensure rescue and firefighting services, facilities and equipment commensurate with the sizes, types and frequency of aircraft in accordance with the aerodrome and regulatory requirements;

(6) assess the feasibility of continuing aerodrome operations in an emergency situation; and

(7) establish and implement necessary policies and procedures for the safe and effective management of aerodrome emergencies and training activities.

(e) Aerodrome quality Post Holder should:

(1) have appropriate Quality Management System(QMS) knowledge and experience;

(2) be responsible for overall performance of the compliance monitoring and quality assurance system, including implementation, maintenance, documentation, effectiveness of oversight system of the organisation;

(3) be a principle communicator with the GCAA in relation to audits, quality assurance and compliance issues;

(4) be directly responsible to the Accountable Manager on matters affecting the adequacy, accuracy and timeliness of the quality assurance requirements in accordance with CAR AGA;

(5) ensure an internal quality audit programme is implemented to audit the aerodrome operator's organisation for conformity with the procedures in their aerodrome and SMS Manual and associated documentation;

(6) ensure the continuing suitability and effectiveness of the internal quality assurance system through the use of statistical analysis and managerial review procedures.

(f) The aerodrome operator should allocate Post Holder roles to personnel in a manner that ensures effective internal oversight and avoids conflict of interest.

(g) The safety Post Holder and quality Post Holder should be senior management positions and should not report to the operations, maintenance, or Rescue Firefighting Service Post Holder.

(h) The combination of Post Holder positions should not be permitted unless an unexpected vacancy necessitates the combination of roles as a temporary contingency measure, and this is subject to acceptance by the GCAA and should be immediately notified to the GCAA for review.

(i) The Post Holders are expected to be senior management personnel who are directly responsible for the proper functioning of the management system. They should have decision making authority and financial control over the relevant part of the management system. While accountability is non-transferable, responsibilities, may be delegated, and therefore the GCAA may accept delegation of certain Post Holder responsibilities with evidence that this delegation is formalised and clearly defined.

GM1 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

POST HOLDER EXPECTATIONS

(a) The Post Holder positions form an essential component of the organisations safety, quality and operational effectiveness and sustainability;

(b) The aerodrome operator will normally require additional management personnel to support the functions of the organisation Post Holders. The organisation is required to maintain Post Holders responsible for the effective functioning of the management systems throughout the organisation (e.g. SMS or QMS), this does not however prevent an appropriate hierarchical structure which effectively manages the activities within the aerodrome operator's organisation.

(c) In any case, it is important that the management system of the aerodrome operator, particularly with regards to quality and safety management, is cohesive and is not fragmented due to commercial arrangements or geographical diversity.

AMC4 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

EXCEPTIONAL CIRCUMSTANCES

Where insurmountable difficulties exist, the GCAA may consider an alternative distribution of Post Holder roles.

In such conditions, the application should satisfy at least the following criteria:

(a) demonstrate the rationale for insurmountable difficulties;

(b) ensure that with regard to competence in different areas of responsibility, there should not be any difference from the requirements applicable to persons holding only one post;

(c) verify the capacity of all proposed Post Holder individuals to meet their responsibilities; and

(d) ensure that there is no possibility for conflict of interest.

AMC5 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

CHANGES TO POST HOLDERS

The aerodrome operator should apply for a change to the nominated Aerodrome Post Holder, with required supporting documentation to the GCAA. The application should additionally include evidence of management of change.

AMC6 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

TEMPORARY AERODROME POST HOLDERS

(a) When a Post Holder is unavailable for lengthy periods, the aerodrome operator should notify the GCAA of a replacement or temporary Aerodrome Post Holder.

(b) The GCAA may request an interview with the proposed temporary Aerodrome Post Holder.

(c) The temporary Post holder should be accepted by the GCAA and should assume the roles and responsibilities as mentioned in AMC3 ADR.OR.A.025(c**).**

AMC7 ADR.OR.A.025(b)(c) Personnel requirements- Certified Aerodromes

POST HOLDERS- KNOWLEDGE ASSESSMENT

(a) Knowledge assessment criteria for Accountable Manager and Post Holders

Accountable Manager	Aerodrome Safety	Aerodrome Operations	Aerodrome Maintenance	RFFS	Quality Assurance
Common to all: • GCAA's regulatory framework, UAE Aviation Law, CARs, SSP, SMS, Aerodrome certification process, oversight, enforcement process; • GCAA's process for the reporting and follow-up of accidents, incidents and emergencies on the aerodrome; • SMS and Quality Management; • Aerodrome Manual; • Human factor principles.					
	Practical expertise and experience in their domain of expertise				
Knowledge and understanding of					
• The documents that prescribe relevant aerodrome safety standards.	Technical understand of the systems that support operations.	The applicable requirements in the area of aerodromes-operations.	The applicable requirements in the areas of electrical systems, AGL	The applicable requirements in the areas	Technical background to understand the systems

• Safety, Security and Quality Management systems related principles and practices and their integration. • Key issues of risk management within the aerodrome			and pavements.	of RFS and aerodromes.	that support operation.
Understanding of the requirements for competence of aerodrome management personnel, so as to ensure that competent persons are in place.	SMS and its interface with other systems.	safety and quality management systems.	applicable specific provisions adopted by the GCAA , such as ICAO publications.	applicable specific provisions adopted by the GCAA , such as ICAO publications.	QMS and its interface with other system.
	Requirements as stated in CAR -AGA and CAR-SMS	Requirements as stated in CAR- AGA, Part - OPS.	.		

Table OR 1: GCAA's Post Holder Assessment Criteria

(b) Assessment criteria for Accountable Manager and Post Holders- Supporting document

Accountable Manager	Post Holders
• Organisational Structure; • MOC (where applicable); • CV; relevant documents if requested by the GCAA	• Organisational Structure; • Job description; • MOC (where applicable); • CV; • Proof of relevant training / qualification /experience; Other relevant documents if requested by the GCAA

Table OR 2 : Supporting documents - Assessment Criteria

Note: Acceptance of a Post Holder by the GCAA is based upon the knowledge assessment criteria and should not be considered as GCAA's endorsement of the performance capabilities of the Post holder.

GM2 ADR.OR.A.025(c) Personnel requirements- Certified Aerodromes

POST HOLDER INTERVIEW

(a) The GCAA's process for acceptance of Post Holders is based on the applicant demonstrating knowledge of the applicable regulations, understanding the Post Holder's role applied for and of the standards required by the GCAA. The process includes a review by the GCAA of the submitted details to determine the suitability of the person for the role of a Post Holder.

(b) Possible agenda items include

(1) information from the GCAA on organisation and mission of the GCAA, the regulatory framework and specifically Safety Management System requirements;

(2) information from the nominated person concerning the intended work area;

(3) enforcement methodology of the GCAA;

(4) the role and responsibility of the Aerodrome Post Holder;

(5) expected competence requirement of the nominated person in relation to present personal status and experience presented in their curriculum vitae or equivalent documentation;

(6) discussion concerning depth of knowledge and understanding of the applicable legislation and regulations;

(7) understanding of aviation in general and for the specific nominated post, how operators/activities at the aerodrome including Air Navigation Service Providers, and other aviation activities can impact aircraft safety; and

AMC1 ADR.OR.A.025(f) Personnel requirement - Certified Aerodromes

RESOURCE ASSESSMENT

(a) Aerodrome operator should carry out an analysis to compare existing and planned operations with the requirement to provide sufficient numbers of trained personnel appropriate for the scale and complexity of the aerodrome and its operations. This analysis should be subject to regular review to identify any gaps in the requirement.

(b) As part of the analysis process, each assessment should refer to the following categorisation of “High” “Medium” or “Low” in relation to the scale, complexity and demands of the operation and for the provision of a dedicated aerodrome operations team.

(c) Once the analysis has been completed and fully documented, the staffing levels, resources and processes, that have been identified as missing or inadequate, should form the basis for an implementation plan, which may be subject to the acceptance by the GCAA.

Aerodrome category	Complexity / Density of operations	Requirement
High	• More than one runway; • Airfield with runway (s) and FATO; • Significant airfield developments; • Instrument runway(s); • Traffic density of ATS unit: high / medium.	Dedicated operations team; No extraneous or ancillary duties (Other than AEP response tasks).
Medium	• One runway; • Instrument runway; • Traffic density of ATS unit: medium.	Dedicated operations team; Extraneous or ancillary duties allowable under assessment. (Other than AEP response tasks)
Low	• One runway; • Non-instrument runway; • No shift patterns; • Traffic density of ATS unit: low.	Option to have a multi-tasked team allowable under assessment.

Table OR 3: Resource Assessment criteria

GM1 ADR.OR.A.025(f) Personnel requirement - Certified Aerodromes

RESOURCE ASSESSMENT

Elements to consider for the analysis:

(a) Aerodrome inspection requirements appropriate to the operational use of runway(s) and taxiways;

(b) Complexity of aerodrome layout, for example:

(1) scale of aerodrome (geographical);

(2) scale of aerodrome (number of runways and taxiways);

(3) scale of aerodrome (lay out of aprons and stands).

(c) Complexity of operations i.e. CAT I, CAT II, CAT III, movement rates;

(d) Low visibility operations;

(e) Day and night use;

(f) Duty hours for operational staff with reference to the following:

(1) compliance with the maximum allowable working hours as defined within the UAE Labour Law;

(2) sufficient break periods / rest-time;

(3) an awareness of the problematic fatigue issues relating to the circadian body clock, to ensure so far as is reasonably possible, fatigue does not impair operational safety;

(4) environmental factors, such as extensive time spent in warm and hot weather conditions;

(5) operational duties required (day);

(6) operational duties required (night);

(7) handover time;

(8) shift patterns;

(9) maximum consecutive hours for both day and night duties (not exceeded); and

(10) maximum numbers of night duties worked in immediate succession;

(g) The number and complexity of aerodrome development projects – inspections and oversight of contractors;

(h) Aerodrome operations procedural requirements and activities as stated in PART ADR.OPS;

(i) Pavement maintenance, duties and inspections;

(j) Visual aids maintenance (signs, markings and markers), duties and inspections;

(k) AGL maintenance, duties and inspections;

(l) Allowance for annual leave, public holidays, training, OJT training, special leave and sickness; and

Sufficient operational administrative support staff (the number of support staff will depend on the complexity of the operations).

GM1 ADR.OR.A.025(g) Personnel requirements- Certified Aerodromes

ORGANISATIONAL STRUCTURE

Acceptance of the organizational structure is achieved through the acceptance of the aerodrome manual. In the review of the structure, the GCAA will normally consider if the proposed structure ensures the following:

(a) that Post Holders have access to the accountable manager;

(b) that Post Holders have clear reporting lines and responsibilities; and

(c) that there is no conflict of interest.

GM1 ADR.OR.A.025 Personnel Requirement- Certified Aerodromes

COMMUNICATION

(a) The GCAA will send all general correspondence to the Accountable Manager.

(b) Following Post Holders are considered as primary point of contact:

(1) Quality Post Holder - oversight activities;

(2) Safety Post Holder - safety performance and SMS activities;

(3) RFFS Post Holder - RFFS activities;

(4) Maintenance Post Holder - maintenance activities;

(5) Operations Post Holder- day to day aerodrome operations.

(c) While the GCAA may on various occasions communicate directly with Post Holders or other positions within the aerodrome, this does not negate the need for the aerodrome operator to ensure all information they receive has been adequately distributed to the necessary persons.

AMC1 ADR.OR.A.025 Personnel requirements- Certified Aerodromes

GENERAL – ACCESS TO RULES AND PROCEDURES

(a) The aerodrome operator should have a system in place to ensure the personnel has access to relevant technical documents and procedures.

(b) The system should have a mechanism to verify that the information has reached the intended recipient.

ADR.OR.A.030 Personnel requirement – Landing Area Acceptance

(a) An aerodrome operator prior to the grant of a Landing Area Acceptance and on an on-going basis shall engage, employ or contract:

(1) sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the aerodrome in accordance with the applicable requirements and the aerodrome operator's training programme; and

(2) sufficient number of supervisors to defined duties and responsibilities, considering the structure of the organisation.

(b) The aerodrome operator shall nominate an Accountable Manager, acceptable to the GCAA, who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. The Accountable Manager shall be responsible for establishing and maintaining an effective management system. Therefore, the Accountable Manager shall:

(1) have full control of the resources, final authority over operations under the certificate/approval of the organisation and ultimate responsibility and accountability for the establishment, implementation and maintenance of management systems, policies, and resolution of all safety issues;

(2) have the final responsibility for all safety issues;

(3) ensure that all necessary resources are available to operate the aerodrome in accordance with the applicable requirements and the aerodrome manual;

(4) ensure that if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations at the aerodrome is implemented;

(5) ensure the establishment, implementation, and promotion of the safety policy;

(6) ensure compliance with relevant applicable requirements, certification basis, and the organisation's safety management system, as well as its quality assurance programme;

(7) ensure the establishment of a just culture which encourages safety reporting;

(8) ensure the establishment, implementation and maintenance of the organisation's competence to learn from the analysis of data collected through its safety reporting system and others Safety Data Collection and Processes Systems (SDCPS) in place; and establishment of safety objectives and safety targets;

(c) The aerodrome operator, shall nominate an Operations Post Holder, who shall be responsible for the management and supervision of safety critical aspects.

(d) The aerodrome operator shall determine the number personnel needed to carry out planned tasks.

GM1 ADR.OR.A.030(a)(1) Personnel requirements- Landing Area Acceptance

QUALIFIED PERSONNEL

(a) The term 'qualified' denotes fitness or fit for the purpose. This may be achieved through fulfilment of the necessary conditions such as completion of required training, or acquisition of a diploma or degree, or through the gaining of suitable experience. It, also, includes the ability, capacity, knowledge or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege or status;

(b) Certain posts may, by nature, be associated with the possession of certain qualifications in a specific field (e.g. rescue and firefighting, civil, mechanical or electrical engineering, wildlife biology, etc.). In such cases, the person occupying such a post is expected to possess the necessary qualifications.

AMC1 ADR.OR.A.030(b) Personnel requirements- Landing Area Acceptance

ACCOUNTABLE MANAGER– GENERAL

(a) The Accountable Manager should have:

(1) knowledge and understanding of aerodrome regulations;

(2) understanding of the requirements for competence of aerodrome operations Post Holders so as to ensure that competent operations postholder is employed;

(3) knowledge and understanding of safety, quality management systems related principles and practices, and how these are applied within the organisation;

(4) knowledge of the role of the accountable manager; and

(5) knowledge and understanding of the key issues of risk management within the aerodrome.

(b) Accountable Manager— Delegation of responsibilities

(1) The technical knowledge and understanding expected by an Accountable Manager are high level, with particular reference to his/her own role in ensuring that standards are maintained;

(2) During periods of absence, the day-to-day responsibilities of the Accountable Manager may be delegated; however, the accountability ultimately remains with the accountable manager.

(3) While accountability is non-transferable, responsibilities may be delegated, and therefore the GCAA may accept delegation of certain responsibilities to a senior management official of the organisation with evidence that this delegation is formalised and clearly defined. The ultimate accountability will always remain with the Accountable Manager.

AMC1 ADR.OR.A.030(c) Personnel requirements- Landing Area Acceptance

POST HOLDERS – ACCEPTANCE

(a) The GCAA's acceptance of Operations Post Holders is based on the applicable assessment criteria for operations holder as established in AMC7.ADR.OR.A.025(c) - Personnel requirements, and the applicant's demonstration of knowledge of the applicable regulations and an understanding of the proposed position).

(b) Nomination of the Post Holder is the responsibility of the aerodrome operator.

(c) Cases for interviews with nominated aerodrome operations Post Holders include the following:

(1) start of operations before issuing the Landing Area Acceptance; or

(2) change of Post Holder.

AMC2 ADR.OR.A.030(c) Personnel requirements- Landing Area Acceptance

POST HOLDER – CONTINUOUS AVAILABILITY

(a) The Aerodrome Operator should ensure the operations post holder role is continually occupied by appropriate and experienced person.

(b) A vacancy, or potential vacancy, of accountable manager / operations post holder position should be notified to the GCAA immediately.

(c) Initial notification of a vacancy should, within 5 working days, be followed by an action plan via the management of change process, to manage and replace the vacant position.

(d) The GCAA may, at any time, restrict, suspend, or revoke, the acceptance of a Post Holder.

AMC3 ADR.OR.A.030(c) Personnel requirements- Landing Area Acceptance

CHANGES TO POST HOLDER

The aerodrome operator should apply for a change to the Accountable Manager or operations Post Holder, with required supporting documentation to the GCAA. The application should additionally include evidence of management of change.

AMC4 ADR.OR.A.030(c) Personnel requirements- Landing Area Acceptance

TEMPORARY AERODROME POST HOLDERS

(a) When a Post Holder is unavailable for lengthy periods, or has left the organisation, the aerodrome operator should notify the GCAA of a replacement or temporary aerodrome Post Holder.

(b) The GCAA may request an interview with the proposed temporary aerodrome Post Holder.

GM1 ADR.OR.A.030(c) Personnel requirements- Landing Area Acceptance

POST HOLDER INTERVIEW

(a) The GCAA's process for acceptance of Post Holders is based on the applicant demonstrating knowledge of the applicable regulations, understanding the Post Holder's role and of the GCAA requirements. The process includes a review of the submitted details to determine the suitability of the person for the role of a Post Holder.

(b) Possible agenda items include:

(1) information from the GCAA on organisation and mission of the GCAA, the regulatory framework and specifically Safety Management System requirements;

(2) information from the nominated person concerning the intended work area;

(3) enforcement methodology of the GCAA;

(4) the role and responsibility of the Post Holder;

(5) expected competence requirement of the nominated person in relation to present personal status and experience presented in their curriculum vitae or equivalent documentation;

(6) discussion concerning depth of knowledge and understanding of the applicable legislation and regulations;

(7) understanding of aviation in general and for the specific nominated post, how operators/activities at the aerodrome including Air Navigation Service Providers, and other aviation activities can impact aircraft safety; and

AMC1 ADR.OR.A.030(d) Personnel requirement – Landing Area Acceptance

RESOURCE ASSESSMENT

(a) Aerodrome operator should carry out analysis to compare existing and planned operations with the requirement to provide sufficient numbers of trained personnel.

(b) Once the analysis has been completed and fully documented, the staffing levels, resources and processes that have been identified as missing or inadequate will form the basis for an implementation plan, which may be subject to the acceptance by the GCAA.

GM1 ADR.OR.A.030(d) Personnel requirement – Landing Area Acceptance

RESOURCE ASSESSMENT

Elements to consider for the analysis, is as follows:

(a) aerodrome inspection requirements appropriate to the operational use of runway(s) and taxiways;

(b) complexity of aerodrome layout, for example:

(1) Scale of aerodrome (geographical);

(2) Scale of aerodrome (lay out of aprons and stands).

(c) Day and night use;

(d) Duty hours for operational staff with reference to the following list:

(1) Compliance with the maximum allowable working hours as defined within the UAE Labour Law;

(2) Sufficient break periods / rest-time;

(3) An awareness of the problematic fatigue issues relating to the circadian body clock, to ensure so far as is reasonably possible, fatigue does not impair operational safety;

(4) Environmental factors, such as extensive time spent in warm and hot weather conditions;

(5) Operational duties required (day);

(6) Operational duties required (night);

(7) Handover time;

(8) Shift patterns;

(9) Maximum consecutive hours for both day and night duties (not exceeded); and

(10) Maximum numbers of night duties worked in immediate succession;

(e) The number and complexity of aerodrome development projects – inspections and oversight of contractors;

(f) Aerodrome operations procedural requirements and activities as stated in PART ADR.OPS;

(g) Pavement maintenance, duties and inspections;

(h) Visual aids maintenance (signs, markings and markers), duties and inspections;

(i) AGL maintenance, duties and inspections;

(j) Allowance for annual leave, public holidays, training, OJT training, special leave and sickness; and

(k) Sufficient operational administrative support staff (the number of support staff will depend on the complexity of the operations).

AMC1 ADR.OR.A.030 Personnel requirements- Landing Area Acceptance

GENERAL - DISTRIBUTION OF RULES AND PROCEDURES

(a) The aerodrome operator should have a system in place to ensure the personnel has access to relevant technical documents and procedures.

(b) The system should have a mechanism to verify that the information has reached the intended recipient.

SECTION B — AERODROME MANUAL AND DOCUMENTATION (ADR.OR.B)

ADR.OR.B.005 Aerodrome manual

(a) The aerodrome operator shall establish and maintain an aerodrome manual, which is a fundamental requirement for aerodrome certification and Landing Area Acceptance, that is acceptable to the GCAA.

(b) The content of the aerodrome manual shall reflect the applicable elements and the requirements set out in this CAR, and shall not contravene the scope of the aerodrome certificate or landing area acceptance. The aerodrome manual shall contain or refer to all necessary information for the safe use, operation and maintenance of the aerodrome, its equipment, as well as its obstacle limitation and protection surfaces and other areas associated with the aerodrome.

(c) The aerodrome operator shall ensure that all aerodrome personnel and all other relevant organisation's personnel have easy access to the portions of the aerodrome manual that are relevant to their duties and responsibilities.

(d) The aerodrome operator shall:

(1) provide the GCAA with complete and current copy of the aerodrome manual, electronically;

(2) provide the GCAA with the intended amendments and revisions of the aerodrome manual, for items requiring prior approval in accordance with ADR.OR.H.065 - Changes, in advance of the effective date and ensure that they do not become effective before obtaining the GCAA's approval.

(e) The aerodrome operator shall:

(1) review the content of the aerodrome manual, ensure that it is kept up to date and amended whenever necessary;

(2) make all aerodrome personnel and other relevant organisations aware of the changes that are relevant to their duties and responsibilities.

(f) The aerodrome operator shall ensure that any information taken from other approved documents, and any amendment thereof, is correctly reflected in the aerodrome manual.

(g) The aerodrome operator shall ensure that the aerodrome manual:

(1) is signed by the Accountable Manager of the aerodrome;

(2) is printed or is in electronic format and is easy to revise;

(3) has a system for version control management which is applied and made visible in the aerodrome manual;

(4) observes human factors principles and is organised in a manner that facilitates its preparation, use and review; and

(5) be supported by a completed aerodrome manual checklist that is provided by the GCAA.

(h) The parts of the aerodrome manual shall be as follows:

(1) Part A- General;

(2) Part B- Aerodrome management system, qualification and training requirements;

(3) Part C- Particulars of the aerodrome site;

(4) Part D- Particulars of the aerodrome required to be reported to the Aeronautical Information Service; and

(5) Part E- Particulars of the operating procedures of the aerodrome, its equipment and safety measures.

AMC1 ADR.OR.B.005 Aerodrome manual

GENERAL

(a) The aerodrome manual may vary in detail according to the complexity of the operation, and the type of the aerodrome.

(b) The aerodrome manual or parts of it may be presented in any form, including electronic form. In all cases, the accessibility, usability, and reliability should be assured.

(c) The aerodrome manual should be such that:

(1) all parts of the manual are consistent and compatible in form and content;

(2) the manual can be readily amended; and

(3) the content and amendment status of the manual is controlled and clearly indicated.

(d) The aerodrome manual should include a description of its amendment and revision process specifying:

(1) the person(s) who may approve amendments or revisions;

(2) the conditions for temporary revisions and/or immediate amendments, or revision required in the interest of safety; and

(3) the methods by which all personnel and organisations are advised of changes to the aerodrome manual.

(e) The aerodrome manual may contain parts of, or refer to other controlled documents, such as aerodrome equipment manual, which are available at the aerodrome for use by the personnel.

(f) If a particular element is not included in an aerodrome manual because it is not applicable to the aerodrome, the aerodrome operator should state in the aerodrome manual:

(1) that the particular element is not applicable; and

(2) why the particular element is not applicable.

GM1 ADR.OR.B.005(b) Aerodrome manual

AERODROME MANUAL

(a) Form of the aerodrome manual

The aerodrome manual is a key document both for the aerodrome operator and the GCAA. The manual is the source document describing how the aerodrome infrastructure, facilities, and operational procedures, will operate safely.

As well as the operational procedures, the GCAA will expect the aerodrome manual to be an accurate reflection of the day-to-day functioning of the aerodrome's SMS, and its safety culture. It will need to show how the aerodrome intends to measure its performance against safety targets and objectives. The reader of an aerodrome manual should be given a clear statement of how safety is developed, managed, and maintained on the aerodrome. All safety policies, operational procedures and instructions should be contained in detail when relevant or cross-referenced to other controlled, formally accepted or recognised, publications.

At larger aerodromes, the size and complexity of operations, and related procedures may dictate that these procedures could not easily be included in a single document. In such circumstances, it is acceptable to identify and reference within the aerodrome manual the procedures which are not included within it. If this system is to be successful, it is essential that any referenced information, documentation, and procedures are made available as necessary to all operational staff in a similar way as the aerodrome manual itself. For that purpose, a computerised database containing the referenced procedures and information could be suitable. For many small aerodromes/LAA, the aerodrome manual can be both simple and brief as long as it covers procedures essential for satisfactory day-to-day operations.

(b) Purpose of the aerodrome manual

An efficient management structure and a systematic approach to aerodrome operation is essential. The aerodrome manual should contain all the relevant information to satisfactorily describe this structure. It is one of the means by which all relevant operating staff can be informed as to their duties and responsibilities with regard to safety. It should describe the aerodrome infrastructure, services and facilities, all operating procedures, and any restrictions on aerodrome availability.

Accountability for safety must start at the very top of any organisation. One of the key elements in establishing safe working practices is the 'top down' approach where all staff should understand the safety aims of the organisation, the chain of command, and their own responsibilities and accountabilities. As safety management principles are applied, the aerodrome manual should be expanded to describe clearly how the safety of operations is to be managed. To a reader or user of the aerodrome manual, there should never be any doubt in terms of 'safety accountability' for each domain or activity described. Each section should define who is accountable, who is responsible, who has the authority, who has the expertise, and who actually carries out the tasks described in any section.

The principle objective of an aerodrome manual should be to show how management will accomplish its safety responsibilities. The aerodrome manual will set out the policy and expected standards of performance, and the procedures by which they will be achieved.

The aerodrome operator should ensure that:

(1) the responsibilities of the aerodrome operator are clearly described;

(2) the tasks and activities that are to be performed by the aerodrome operator or its subcontractors are listed; and

(3) the means and procedures in order to complete these tasks and activities are described or appended, together with the necessary details on their frequencies and operating modes.

Where responsibilities are attributed to other stakeholders, the aerodrome manual should clearly identify them.

(c) The aerodrome manual may be issued in separate parts.

AMC2 ADR.OR.B.005(g) Aerodrome manual

AERODROME MANUAL - PARTS

The aerodrome manual should have the following structure, and include, at least, the following information; if an item is not applicable, the indication 'Not applicable' or 'Intentionally blank' should be inserted, along with the relevant reason:

(a) PART A- GENERAL

(1) Administration and control of the aerodrome manual including the following:

(i) Introduction

A. a statement signed by the Accountable Manager that the aerodrome manual is prepared in accordance with the applicable requirements.

B. a statement signed by the Accountable Manager that the aerodrome manual contains operational instructions that are to be complied with by the relevant personnel;

C. a list and brief description of the various parts, their contents, applicability, and use;

D. explanations, abbreviations, and definitions of terms needed for the use of the manual;

(ii) System of amendment and revision

A. details of the person(s) responsible for the issuance and insertion of amendments and revisions;

B. a record of amendments and revisions with insertion dates, and effective dates;

C. a description of the system for the annotation of pages, or paragraphs and their effective dates;

D. a list of effective pages or paragraphs;

E. annotation of changes (in the text and, as far as practicable, on charts and diagrams);

F. interim revisions;

G. description of the distribution system and a distribution list for the aerodrome manual, its amendments, and revisions.

(2) General information

General information including the following:

(i) purpose and scope of the aerodrome manual;

(ii) legal requirements for an aerodrome certificate or landing area acceptance and the aerodrome manual as prescribed in these regulations;

(iii) conditions for use of the aerodrome by its users;

(iv) the obligations of the aerodrome operator; rights of the GCAA and guidance to staff on how to facilitate audits/inspections by GCAA personnel.

(b) PART B- AERODROME MANAGEMENT SYSTEM, QUALIFICATION AND TRAINING REQUIREMENTS

A description of the management system, including the following:

(1) Aerodrome organisation and responsibilities including the following: a description of the organisational structure, including the general organogram and departments' organograms. The organogram should depict the relationship between the departments. Subordination and reporting lines of all levels of organisational structure (Departments, Sections, etc.) related to safety should be shown;

(2) Names, authorities, responsibilities, and duties of management of nominated postholders, including their position and telephone numbers and matters for which they have responsibility to deal directly with the GCAA on behalf of the organisation ; responsibilities and duties of other operational, maintenance personnel, as well of the aerodrome safety committees and the Local Runway Safety Team and their functioning, should also be included;

(3) A description of the safety management system, including:

(i) scope of the safety management system;

(ii) safety policy and objectives;

(iii) safety responsibilities of key safety personnel;

(iv) documentation control procedures;

(v) safety risk management process, including hazard identification and risk assessment schemes;

(vi) monitoring of implementation and effectiveness of safety actions, and risk mitigation measures;

(vii) safety performance monitoring;

(viii) safety reporting (including hazard reporting) and investigation;

(ix) emergency response planning;

(x) management of change (including organisational changes with regard to safety responsibilities);

(xi) safety promotion; and

(xii) safety management system outputs.

(4) A description of the compliance monitoring and related procedures.

(5) A description of the quality management system for aeronautical data and aeronautical information provision activities and related procedures, including those for meeting the relevant safety, and security management objectives.

(6) Procedures for reporting to the GCAA including handling, notifying and reporting accidents, serious incidents, and occurrences. This section should include, at least, the following:

(i) definition of accident, serious incident and occurrence and of the relevant responsibilities of all persons involved;

(ii) illustrations of forms to be used (or copies of the forms themselves), instructions on how they are to be completed, the addresses to which they should be sent and the time allowed for this to be done;

(iii) procedures and arrangements for the preservation of evidence, including recordings, following a reportable event;

(7) Procedures for:

(i) complying with safety decisions and publications;

(ii) reaction to safety issue; and

(iii) handling of safety recommendations.

(8) A description of the method and procedures for recording aircraft movements, including movement and aircraft type, dates, and number of passengers.

(9) Required aerodrome personnel qualifications. Moreover, procedures related to:

(i) the training programme, including the following:

A. responsibilities, frequencies, syllabi, duration of each type of training, method for delivery of training and competency assessment, minimum performance to be achieved by the trainees, and the identified training standards for all personnel involved in the operation, rescue and firefighting, maintenance and management of the aerodrome, and those persons operating unescorted on the movement area and other operational areas of the aerodrome.

B. procedures:

1) for training and competency assessment of the trainees;

2) to be applied in the event that personnel do not achieve the required standards.

(ii) the proficiency check programme, responsibilities and frequencies of proficiency checks including:

A. checking methods and procedures.

B. procedures to be applied in the event that personnel do not achieve the required standards.

C. the validation process to measure the effectiveness of the programme

(10) Description of documentation to be stored and their storage periods.

(c) PART C- PARTICULARS OF THE AERODROME SITE

A description of the aerodrome site including in particular, the following information:

(1) a plan showing the distance of the aerodrome from the nearest city, town, or other populous area;

(2) detailed maps and charts of the aerodrome showing the aerodrome's location (longitude and latitude) and boundaries, major facilities, aerodrome reference point, layout of runways, taxiways and aprons, aerodrome visual and non-visual aids, and wind direction indicators;

(3) a plan showing the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome;

(4) description of the physical characteristics of the aerodrome, elevations, visual and non-visual aids, as well as the information regarding the aerodrome reference temperature, strength of pavements, rescue and firefighting level of protection, ground aids and main obstacles;

(5) description of equivalent level of safety if used and approved by the GCAA, special conditions, and operating limitations; and all deviations from the regulatory provisions authorized by the GCAA should be listed together with their validity and references to the related documents (including any safety assessments);

(6) description of the types of operations that the aerodrome is approved to conduct including:

(i) a statement of the Aerodrome Reference Code, indicating the largest aircraft type the aerodrome intends to serve; and type of traffic;

(ii) category of the runway(s) provided (non-instrument, instrument including non-precision and precision);

(iii) the different runways and their associated level of service;

Note: Level of service is a description of the RVR for each runway.

(iv) the nature of aviation activities (commercial, passenger, air transport, cargo, aerial work, general aviation etc.);

(v) the type of traffic permitted to use the aerodrome (international/national, IFR/VFR, scheduled/non-scheduled);

(vi) the lowest meteorological conditions or RVR permitted for aircraft arrivals and departures at the aerodrome;

(vii) any limitations on operations of the aerodrome, including area excluded from use by commercial aircraft.

(d) PART D — PARTICULARS OF THE AERODROME REQUIRED TO BE REPORTED TO THE AERONAUTICAL INFORMATION SERVICE

(1) The aeronautical information services available and the procedures for the promulgation of general information, including the following:

(i) the name of the aerodrome;

(ii) the location of the aerodrome;

(iii) the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System — 1984 (WGS-84) reference datum;

(iv) the aerodrome elevation and geoid undulation;

(v) the elevation of each threshold and geoid undulation, the elevation of the runway end, and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;

(vi) the aerodrome reference temperature;

(vii) details of the aerodrome beacon; and

(viii) the name of the aerodrome operator and contact details (including telephone numbers) of the aerodrome operator at which may be contacted at all times.

(2) Aerodrome dimensions and related information, inducing the following:

(i) runway — true bearing, designation number, length, width, displaced threshold location(if any), slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;

(ii) length, width and surface type of strip, runway end safety areas, stopways; length, width and surface type of taxiways; apron surface type and aircraft stand; clearway length and ground profile;

(iii) declared distances;

(iv) visual aids for approach procedures, approach lighting type and visual approach slope indicator system; marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways and aprons, location and type of visual docking guidance system; availability of standby power for lighting;

(v) the location and radio frequency of VOR aerodrome checkpoints;

(vi) the location and designation of standard taxi routes;

(vii) the geographical coordinates of each threshold, appropriate taxiway centre line points, and aircraft stands;

(viii) the geographical coordinates, and the top elevation of significant obstacles in the approach and take-off areas, in the circling area and in the surroundings of the aerodrome (in the form of charts);

(ix) pavement surface type and bearing strength using the Aircraft Classification Rating — Pavement Classification Rating (ACR-PCR) method;

(x) pre-flight altimeter check locations established and their elevation;

(xi) disabled aircraft removal plan, contact details (telephone/telex/fax numbers and e-mail address) of the aerodrome coordinator for the removal of disabled aircraft, and information on the capability to remove disabled aircraft, expressed in terms of the largest aircraft type;

(xii) rescue and firefighting level of protection; types and amounts of extinguishing agents normally available at the aerodrome; Nominate fire command call frequency as 121.6MHz; and

(xiii) Cases of equivalent level of safety, special conditions, and limitations.

(e) PART E — PARTICULARS OF OPERATING PROCEDURES OF THE AERODROME, ITS EQUIPMENT, AND SAFETY MEASURES

All procedures contained in the aerodrome manual should include and clearly define the roles, responsibilities, and contact details of responsible aerodrome personnel, other persons or organisations, including the contracted organisations and other agencies involved, as appropriate, and consider the need for establishing direct communication during non-working hours.

(1) Aerodrome reporting, including:

(i) arrangements and procedures for reporting changes to the aerodrome information set out in the AIP and requesting the issue of NOTAM, including reporting changes to the GCAA and recording of the reporting of changes;

(ii) procedures and frequencies for aeronautical data surveying, including areas to be surveyed;

(iii) description of the procedures used for obtaining aeronautical data, ensuring it meets quality standards, promulgation to the Aeronautical Information Service and review of the published information.

(2) Procedures for accessing the aerodrome movement area, including:

(i) coordination with the security agencies;

(ii) prevention of unauthorised entry into the movement area;

(3) Procedures for the inspection, assessment and reporting of the condition of the aerodrome

movement area and other operational areas and facilities, (including runway surface friction characteristics assessments and water-depth measurements), including:

(i) arrangements and means of communicating with the air traffic services unit during inspections;

(ii) inspection checklists, logbook, and record-keeping; and

(iii) inspection intervals and times; reporting results and follow-up actions.

(4) Procedures for the inspection, and routine and emergency maintenance of visual and non-visual aids, as appropriate, and the aerodrome electrical systems, including:

(i) inspection checklists, logbook, and record keeping; and

(ii) inspection intervals and times; reporting results and follow-up actions.

(5) Operating, maintenance and repair instructions, servicing information, troubleshooting and inspection procedures of aerodrome equipment.

(6) Procedures for:

(i) maintenance of the movement area, including paved and unpaved area, runways , taxiways and their strips and aerodrome drainage;

(ii) friction testing, assessment and corrective programme for removal of rubber build up or surface rehabilitation on the runway;

(iii) overload operations.

(7) Procedures for managing aerodrome works, including:

(i) coordinating, planning, and carrying out construction and maintenance work; and

(ii) arrangements and means of communicating with air traffic services unit and other stake holders during the progress of such work.

(8) Procedures for apron management, including:

(i) point and procedure for transfer of the aircraft between air traffic services unit, and the apron management unit where applicable;

(ii) allocation of aircraft parking positions;

(iii) engine start and aircraft push-back; and

(iv) marshalling and 'follow-me' service.

(9) Procedures for apron safety management, including:

(i) protection from jet blasts and downwash;

(ii) enforcement of safety precautions during aircraft refuelling operations;

(iii) FOD prevention, including apron cleaning/sweeping;

(iv) monitoring compliance of personnel on the apron with safety procedures; and

(v) escorting, controlling and protecting passengers on the apron, from vehicular traffic and operating aircraft, use of predetermined routes, and avoiding interference with stationary aircraft ground servicing activities.

(10) Procedures for airside vehicle control

(i) Procedures for the control and limitation of the number of vehicles operating on the movement area, issuance of authorisations and temporary permits of vehicles operating on or in the vicinity of the movement area, including driver's obligations, traffic rules, right of way, speed limits, and procedures for issuing driving authorisations and permits, and enforcement procedures;

(ii) Procedures for escorting vehicles occasionally used in areas where radio and transponder or equivalent is required, as well as for vehicles temporarily permitted to operate on the movement area;

(iii) Procedures and responsibilities for establishing and monitoring the implementation of the maintenance programme for vehicles operating on the movement area and other operating areas.

(11) Procedures for wildlife hazard management, including assessing wildlife hazards and arrangements for implementation of the wildlife control programme, and promulgation of the relevant information to the AIS;

(12) Procedures for:

(i) obstacle control and monitoring within and outside of the aerodrome boundaries, and notification to the GCAA, of the nature and location of obstacles, and any subsequent addition, or removal of obstacles for action as necessary, including amendment of the AIS publications; and

(ii) monitoring and mitigating hazards related to human activities and land-use, on the aerodrome and its surroundings;

(iii) relevant inspection checklists, logbook, and record keeping; inspection intervals and times; reporting results and follow-up actions.

(13) Aerodrome emergency plan including:

(i) dealing with emergencies at the aerodrome or in its surroundings;

(ii) tests for aerodrome facilities and equipment to be used in emergencies, including their frequency; and

(iii) exercises to test emergency plans, including their frequency.

(14) Rescue and firefighting, including description of facilities, equipment, personnel and procedures for meeting the promulgated level of protection;

(15) Removal plan of disabled aircraft, including relevant arrangements, equipment, and procedures for its implementation.

(16) Procedures used for the safe handling and storage of hazardous material on the aerodrome, including the following:

(i) Details of special areas on the aerodrome set-up for the storage of flammable liquids (including aviation fuels) and any other hazardous material;

(ii) The method to be followed for the delivery, storage, dispensing and handling of hazardous materials;

(iii) Description of the system in place to test the quality of aviation fuel prior to dispensing into aircraft; and

(iv) Description of the procedures in place on the apron to ensure safety during aircraft refuelling/defueling operations.

(17) Low visibility operations: description of operational procedures, including coordination with air traffic services unit and where applicable, apron management unit, standard taxiing routes, control of activities, and measurement and reporting of runway visual range;

(18) Procedures for operations in adverse weather;

(19) Procedures for night operations;

(20) Procedures for the protection of radar and other navigational aids, control of activities, and ground maintenance in the vicinity of these installations;

(21) Procedures for the operation of aircraft that exceeds the certified design character of the aerodrome, including taxiing routes;

(22) Procedures and measures for the prevention of fire at the aerodrome;

(23) Communication procedures, including: frequencies and phraseology to be used when communicating with the air traffic services; vehicle call signs; communication signals to be used in case of radio communication failure; communication via the air traffic services provider; and dissemination of significant information;

(24) Aircraft towing procedures, including: designated routes to be used; lights to be displayed by aircraft; communication procedures; guidance to be provided; measures for ensuring safety of towing operation in adverse weather conditions, including visibility and weather phenomena in which towing is limited or not permitted;

(25) Procedures for the handover of activities between aerodrome personnel, including description of the system for the provision of operational information to other organisations operating at the aerodrome;

(26) (Intentionally left blank)

(27) Procedure for managing changes;

(28) Method of calculating reduced declared distances when there are temporary objects infringing the runway strip, or the approach and take-off surfaces or for other reasons when

the threshold has to be displaced;

(29) Procedures and responsibilities for handling of activities and / or services that are fully contracted to a third party including the focal point for the contracted organisation.

GM1 ADR.OPS.OR.B.005(h) Aerodrome manual

(a) Aerodrome Operators are encouraged to provide the plans and diagrams in a format that will permit the production of charts in accordance with the specifications of ICAO Annex 4. The use of graphical tools and geographically aligned and georeferenced to WGS84 is preferable;

(b) The size of the plans should be commensurate with the size and complexity of the aerodrome, however ideally an A3 or A4 size drawing should be included in the Aerodrome Manual. The scale of the plans should be sufficiently large to show clearly all the elements listed from (d) to (i) below;

(c) Where, due to the size and complexity of the aerodrome, it is not practicable to include the plans in the aerodrome manual, the aerodrome manual should contain a reference to the plan and its location;

(d) Location Plan

Plan of the aerodrome location showing the aerodrome as expressly set aside for aerodrome purposes, including any aerodrome facilities and equipment outside the boundaries of the aerodrome.

(e) Boundary Plan

A plan showing the boundaries of the aerodrome and permanent survey points. This would normally be shown on a title deed. If the boundaries of the aerodrome are not defined in the documents of the title - provide details of claim to land or interest in, the property on which the aerodrome is located and a plan showing the boundaries and position of the aerodrome.

(f) Aerodrome Plan

Plan of the aerodrome showing the aerodrome facilities for the operation of the aerodrome including (where applicable):

(1) Aerodrome Reference Point with elevation and geographical coordinate (WGS84) labelled;

(2) runways with dimensions labelled;

(3) runway surface types (concrete, asphalt, gravel, etc.) labelled;

Note: Bearing strengths or aircraft type restrictions may be shown in tabular form.

(4) runway end elevations;

(5) runway strip with dimensions labelled;

(6) stopway with stopway end elevation;

(7) clearway with dimensions labelled, and clearway end elevations;

(8) Runway End Safety Area;

(9) approach lighting;

(10) taxiways with names;

(11) taxiway surface types;

Note: Bearing strengths or aircraft type restrictions may be shown in tabular form.

(12) apron with names;

(13) navigational aids labelled with type (VOR, DME, etc.) showing critical and sensitive areas identified where possible;

(14) localiser array aerials (with critical and sensitive areas shown);

(15) glide path aerials (with critical and sensitive areas shown);

(16) airside roads;

(17) terminal buildings;

(18) airport fire station(s);

(19) aerodrome control tower;

(20) power supply buildings;

(21) other main buildings relevant to the operation of the aerodrome;

(22) airside/landside perimeter fence;

(23) airside/landside perimeter gates (with gate numbers labelled);

(24) meteorological facilities including wind indicators;

(25) boundary of the air traffic control service; and

(26) any part of the movement area permanently unsuitable for aircraft and clearly marked as such.

(g) Apron Plan

(1) plan of the apron areas including (where applicable):

(2) apron with identifying names;

(3) bearing strengths or aircraft type restrictions;

Note: Bearing strengths or aircraft type restrictions may be shown in tabular form.

(4) apron markings associated with the movement and parking of aircraft;

(5) aircraft parking bay designations clearly labelled;

(6) apron markings associated with the parking of vehicles and equipment;

(7) apron markings associated with the operation of vehicles;

(8) location of any nose in guidance system;

(9) any run–up bays or engine start points;

(10) the limits of the apron area;

(11) the boundary of the air traffic control service;

(12) any buildings that front onto the apron;

(13) access gates to the airside area;

(14) a table showing the maximum aircraft code, type, or size permitted to park on each aircraft stand;

(15) helicopter landing sites and helicopter aiming points; and

(16) any part of the apron area permanently unsuitable for aircraft and clearly marked as such.

(h) Ground Movement Plan

Plan of ground markings used for aircraft guidance showing

(1) all runway markings;

(2) markings in pre-threshold areas; and

(3) taxiway and taxilane markings.

(i) Lighting Plan

Plan of the airfield lighting showing, where applicable

(1) approach lights;

(2) runway threshold lights;

(3) runway threshold identification lights;

(4) runway edge lighting;

(5) runway end lighting;

(6) stopway lights;

(7) visual landing aids (e.g. PAPI);

(8) runway guard lights;

(9) stop bar and intermediate taxiway holding position lighting;

(10) taxiway lighting;

(11) apron flood lighting;

(12) obstacle lights on the aerodrome; and

(13) illuminated windsocks;

(14) any other aeronautical ground lighting.

SECTION C – AERODROME CERTIFICATION ACTIVITIES (ADR.OR.C)

ADR.OR.C.001 Scope

Unless otherwise specified, the requirements of this section are applicable to land and water aerodromes, used for domestic and/or international flights.

ADR.OR.C.005 Certification obligations

Prior to commencing the operation of an aerodrome, the aerodrome operator shall obtain the applicable aerodrome certificate issued by the GCAA.

ADR.OR.C.006 Expression of interest for Certification of an Aerodrome

The applicant for an aerodrome certificate shall formally inform the GCAA in writing of their interest to develop and operate an aerodrome.

GM1 ADR.OR.C.006 Expression of interest for an Aerodrome Certificate

EXPRESSION OF INITIAL INTEREST

(a) The applicant for aerodrome certificate should arrange for a meeting with the GCAA and provide details of the proposed aerodrome site as well as concept of operations.

The applicant should make arrangements for its key personnel to be present during this meeting. During this meeting, the applicant should present to the GCAA their plans with regard to the aerodrome design and operations.

(b) During the meeting, the applicant may be:

(1) provided by the GCAA with general information about the applicable requirements for the aerodrome;

(2) provided with copies of the applicable requirements, and a description of the procedures that are followed during the certification process; and

(3) informed by the GCAA about possible approvals, permits, or clearances that may be needed to be obtained from other authorities.

(c) The GCAA will provide a formal confirmation for the applicant to proceed with a formal application.

ADR.OR.C.010 Application for an Aerodrome Certificate

(a) Pursuant to the United Arab Emirates Federal Act No. 20 (1991) Promulgating The Civil Aviation Law Article 27 and to the Civil Aviation Regulations (CARs) for the time being in force , an Aerodrome Certificate may be granted by the GCAA, if it is satisfied that an applicant is competent, having regard to the applicant's previous conduct and experience, the equipment, organisation, staffing, maintenance and other arrangements, to ensure that the aerodrome and airspace are safe for use by aircraft.

(b) The requirement for Aerodrome Certificate is as follows:

Aerodromes that are:

(1) used for international flights; or

(2) domestic flights; or

(3) used for air services; or

(4) using instrument approach or departure procedures.

Note: These aerodromes are characterised as commercial facilities available to the general public for ticketed or charter operations for domestic or international flights.

(c) The applicant for an Aerodrome Certificate shall be the operator of the aerodrome who can be:

(1) the owner of the land on which the aerodrome is located; or

(2) the occupier of the land on which the aerodrome is located; or

(3) the actual person or organisation operating the aerodrome and holding a formal consent from the owner or occupier of the land on which the facility is located.

(d) The application for Aerodrome Certificate shall include The Federal Cabinet approval for international airports.

(e) The application for an Aerodrome Certificate and subsequent document submissions shall be made in a form and manner established by the GCAA that includes no-objections certificates, approvals.

Applicant for Aerodrome Certificate shall obtain approvals from GCAA in relation to Airspace and all relevant agencies, authorities and entities including those mentioned in AMC2 ADR.OR.C.010(e).

(f) The applicant shall pay the applicable fees.

(g) The applicant shall provide the GCAA with the following:

(1) declaration of compliance and the completed compliance register;

(2) documentation demonstrating how it will comply with the applicable requirements. Such documentation shall include a procedure, describing how changes will be managed and notified to the GCAA; subsequent changes to these procedures shall require prior approval by the GCAA;

(h) Applicant for Aerodrome Certificate shall demonstrate to the GCAA their compliance to the requirements of CAR PART – ADR, their arrangements for safeguarding of area within the OLS and beyond.

(i) The applicant shall satisfy the certification requirement at each stage of the application process as detailed in the GM1 ADR.OR.C.010(i)

(j) The applicant of an Aerodrome Certificate shall not commence any construction activity until the design is accepted by the GCAA.

ADR.OR.C.010 Application for an Aerodrome Certificate

AERODROME CERTIFICATE APPLICATION PROCESSING STAGES

Processing stage	Activity	Related AMC/GM
Stage 1	Assessment of application	AMC1 ADR.OR.C.010(c) Relationship of the applicant with the aerodrome owner. GM1 ADR.OR.C.010(c) Registration of the organisation. AMC1 ADR.OR.C.010(e) Information to be provided to the GCAA for design acceptance. AMC2 ADR.OR.C.010(e) Other no-objections, approvals and permissions. AMC3 ADR.OR.C.010(e) Meteorological study.

	Payment of fees	AMC1 ADR.OR.C.010(f) Applicable fees.
	Design acceptance	AMC1.ADR.OR.C.010(j)– Design acceptance.
Stage 2	Evaluation of the aerodrome manual submitted by the applicant.	AMC1 ADR.OR.C.010 (e)(g) Aerodrome manual ,AEP, SMS.
	Evaluation of the competence and experience of the aerodrome staff.	AMC2 ADR.OR.C.010 (e)(g) Adequacy of structure and resources.
	Assessment of aerodrome physical characteristics, facilities and equipment. And certification	AMC3 ADR.OR.C.010(g) Assessments and evaluations.
	Evaluation of aerodrome operating procedures.	AMC3 ADR.OR.C.010 (e)(g) Assessments and evaluations.
	Evaluation of aerodrome operator's SMS.	AMC1 ADR.OR.C.010 (e)(g) Aerodrome manual ,AEP, SMS.
	Evaluation of aerodrome emergency plan, rescue and firefighting capabilities	AMC1 ADR.OR.C.010 (e)(g) Aerodrome manual ,AEP, SMS.
Stage 3	Issuance or refusal of aerodrome certificate.	GM1 ADR.OR.C.010(i) Issuance or refusal of aerodrome certificate. GM2 ADR.OR.C.010(i) Timescale for processing of applications.
	Publication of certified status of an aerodrome and the required details in the AIP.	GM1. ADR.OR.C.010 Promulgation of status of the Aerodrome Certificate.

AMC1 ADR.OR.C.010(c) Application for an Aerodrome Certificate

RELATIONSHIP OF THE APPLICANT WITH THE AERODROME OWNER

(a) The applicant should provide the GCAA with all information necessary to demonstrate to the GCAA its relationship with the aerodrome owner, and/or the owner of the land to be used for the aerodrome development.

(b) Such documentation should include, but is not limited to, relevant portions of contracts, lease agreements, authorisations between the persons involved, etc.

GM1 ADR.OR.C.010(c) Application for an Aerodrome Certificate

REGISTRATION OF THE ORGANISATION

(a) Applicant should register their organization in the GCAA's website, in order to make their application through GCAA's e-services or through other means established for this purpose by the GCAA.

(b) Applicants should provide evidence of their identity such as establishment / trade license documentation and official documents as required during the registration process.

(c) Applicant should provide all documents and information as required in the application portal.

(d) Applicants should have secure access to the GCAA e-Services, available on the GCAA's website: www.gcaa.gov.ae. Applicants who do not have access to the GCAA's e-Services must make an initial request through GCAA's customer service channels.

AMC1 ADR.OR.C.010(e) Application for an Aerodrome Certificate

INFORMATION TO BE PROVIDED TO THE GCAA FOR DESIGN ACCEPTANCE

(A) The location of the aerodrome, and its boundaries, including maps and charts to indicate various facilities and area in the aerodrome;

Maps should clearly indicate the aerodrome operational area which include, at least, runways, taxiways, aprons, associated strips, runway end safety areas, stopways, clearways, aerodrome visual aids, fixed aerodrome equipment, other aerodrome operational areas, areas adjacent to the movement area. This defined area will be subject to aerodrome operations safety oversight by the GCAA following the issue of an aerodrome certificate.

Aerodrome boundary should not be confused with the boundaries established for other purposes, such as fences, the land ownership boundaries used by local planning authorities, or those used to designate security restricted zones ,custom controlled areas, etc.

(b) the type of operations at the aerodrome including:

(1) the aircraft types to be served at the aerodrome, and the critical aircraft type to be used for the design of the aerodrome;
(2) the type of approaches, landing, and/or take-off operations on each runway/FATO;
(3) operations during the day and/or night;
(4) operational concept and the associated airspace;

(5) any limitations to the operation of the aerodrome;

(6) the design and facilities of the aerodrome, in accordance with the applicable certification specifications established by the GCAA;

(7) unmanned aircraft operations including fuelling and charging facilities.

(c) information about the location of the aerodrome - the exact location of the aerodrome should be depicted on a map of a suitable scale acceptable to the GCAA;

(d) drawings in suitable scale , electronic format acceptable to the GCAA should contain:

(1) orientation of Runway(s) / FATOs

(2) the dimensions of the aerodrome's physical characteristics;

(3) the visual and non-visual aids;

(4) the obstacle limitation surfaces, and any other surfaces applicable; and

(5) the aerodrome facilities, installations, and fixed equipment and their location.

(e) description, height, and location of obstacles, in accordance with the applicable aeronautical data requirements (see ADR.OPS. A.005).

(f) The applicant should identify the applicable Certification Specifications for the design and type of operations of the proposed aerodrome and provide the GCAA with evidence that the proposed design and operation complies with applicable regulations , the applicant should also provide the GCAA with:

(1) the Compliance register in the form and manner as established by the GCAA;

(2) the Certification Specifications for which it proposes to show compliance in a different manner and demonstrate an equivalent level of safety. Such a proposal has to be acceptable to the GCAA. In such cases, the applicant should also propose the method that will be used to demonstrate compliance and achieve an equivalent level of safety, and submit all necessary documentation to support the proposal.

AMC2 ADR.OR.C.010(e) Application for an Aerodrome Certificate

OTHER NO-OBJECTIONS, APPROVALS, AGREEMENTS AND PERMISSIONS

(a) A letter of no objection should be obtained from the appropriate authorities ensuring that the necessary arrangements have been made with regard to the protection of the Obstacle Limitation Surfaces (OLS).

(b) Applicants should obtain required approvals from other Appropriate Authorities (i.e. municipalities, civil defense, local departments of civil aviation, appropriate authorities, etc.);

(c) In addition to the application for an Aerodrome Certificate, other certification or approvals should be required if Air Navigation Services such as ATS, CNS, MET and AIS is to be provided.

(d) Applicants may be required to apply for other certificates or approvals from the GCAA; this will be dependent upon the scale and type of operations the aerodrome is intended to be used. Other areas that require certification or approval are:

(1) Air Navigation Services:

For the purposes of arrangements for Air Navigation services.

(2) Airspace:

For the purpose of ensuring the suitability of the proposed site from an airspace perspective.

(3) Aviation Security:

To confirm that supporting resources and facilities required by aviation security services are made available at airports serving civil aviation.

(e) There may also be other bodies that the applicants should inform in their own interests and it is the responsibility of the aerodrome operator to obtain the appropriate approvals. The application for planning/building permissions and the request for an aerodrome certificate are not interdependent and are required to be made separately.

(f) As a part of the aerodrome certification process, the physical characteristics and design should consider, where appropriate, land-use and environmental control measures.

(g) Previously issued approvals, if any, will generally be reassessed each 12 months if there are delays or extended periods of inactivity.

(h) Applicant should have arrangement (MOU or agreement) with the AIS to ensure up-to-date information of aerodrome safety-related conditions are published.

AMC3 ADR.OR.C.010(e) Application for an Aerodrome Certificate

METEOROLOGICAL STUDY

The applicant should have details of the study of the area of the aerodrome, including temperature, visibility, ceiling and wind conditions; moreover, the study should provide information on wind conditions occurring with poor visibility and/or low cloud base at the aerodrome, and their frequency, as well as the accompanying wind direction and speed.

For Meteorological requirements refer to CAR-MET- Meteorological Services.

AMC1 ADR.OR.C.010(j) Application for an Aerodrome Certificate

DESIGN ACCEPTANCE

(1) GCAA's Design Acceptance is based on the assessment of the information provided by the applicant and is valid for a period of one year. If construction of the aerodrome has not been commenced by that time, the applicant should request for an extension of the Design Acceptance to ensure that the proposal remains in compliance with GCAA Regulations.

(2) The issue of a Design Acceptance does not permit the aerodrome to be used for operations until when construction is completed and an Aerodrome Certificate is obtained from the GCAA.

AMC1 ADR.OR.C.010(f) Application for an Aerodrome Certificate

APPLICABLE FEES

Service fees, as published on the GCAA's website are varied from time to time and should be paid to the GCAA:

(a) during the initial Aerodrome Certificate; and

(b) on a periodic basis after the grant of an Aerodrome Certificate;

for each aerodrome.

Note :Payment of the GCAA's service fee does not guarantee the grant or continuation for aerodrome operations or of an Aerodrome Certificate.

AMC1 ADR.OR.C.010(e)(g) Application for an Aerodrome Certificate

AERODROME MANUAL, AEP, SMS

(a) The manuals mentioned below and their amendments should be submitted to the GCAA in electronic format that allows the GCAA to review, store, and reproduce it.

(1) an electronic version of the Aerodrome Manual, as required by ADR.OR.B.005 - Aerodrome Manual , including the Aerodrome Manual Checklist.

(2) an electronic version of the Aerodrome Operator's Safety Management System (SMS) manual as required by CAR SMS ,including a SMS manual checklist;

(3) an electronic version of the Aerodrome Emergency Plan (AEP) as required by Part ACM, including an AEP manual checklist;

(b) The GCAA will evaluate and verify if :

(1) the Aerodrome Manual contains all pertinent information on the aerodrome site, facilities, services, equipment, operating procedures, organization and management;

(2) the aerodrome operator's safety management system and supporting operating procedures make satisfactory provision for the safety of aircraft;

(3) the aerodrome Rescue Firefighting Service is staffed, trained, equipped, operated and organised to the meet the applicable requirements.

AMC2 ADR.OR.C.010(e)(g) Application for an Aerodrome Certificate

ADEQUACY OF STRUCTURE AND RESOURCES

(a) The applicant should provide all necessary information needed in order to demonstrate to the GCAA that its proposed organisation and management are suitable, and properly matched to the scale and scope of the operation.

(b) Evidence of adequacy of resources to operate the aerodrome in accordance with ADR.OR.A.025 - Personnel requirements- Aerodrome Certificate;

(c) The GCAA will assess each nominated aerodrome Post Holder based on the assessment criteria as established in this CAR.

AMC3 ADR.OR.C.010(g) Application for an Aerodrome Certificate

ASSESSMENTS AND EVALUATIONS

(a) The GCAA's assessments, site visits and inspections will assess inter-alia physical characteristics, visual aids (markings, lights, signs and markers), obstacle environment ;

(b) Before granting an aerodrome certificate, the GCAA may verify that:

(1) the aerodrome's facilities, services ,equipment and systems are in accordance with the Civil Aviation Regulations and further to review, inspection or Aerodrome Certificate verification audit;

(2) the aerodrome operator's processes and procedures as referenced in the Aerodrome Manual;

(3) the applicant's ability to operate and maintain the aerodrome properly.

(c) The applicant should provide the GCAA, documentation to demonstrate how it will comply with the applicable requirements of this CAR and any other applicable requirements.

GM1 ADR.OR.C.010(i) Application for an Aerodrome Certificate

ISSUANCE OR REFUSAL OF AERODROME CERTIFICATE

(a) The GCAA will only issue an Aerodrome Certificate, when it is completely satisfied that all regulatory and critical safety elements have been adequately addressed; this may require a further GCAA audit

/ inspection follow-up visit and / or special additional operating approvals. This includes evidence of any prior approvals or permissions.

(b) The GCAA may impose operating restrictions and/or sanctions at an aerodrome.

(c) After completion of the processing of the application, the GCAA while granting the Aerodrome Certificate, may endorse the conditions of the type of use of the aerodrome and other details as shown in the Aerodrome Certificate.

(d) In the event of non-compliance with the requirements of this CAR or unresolved safety deficiencies/concerns, the GCAA may refuse to grant an Aerodrome Certificate, in such cases, will notify the applicant in writing of its reasons.

GM2 ADR.OR.C.010(i) Application for an Aerodrome Certificate

TIMESCALE FOR PROCESSING OF APPLICATIONS

(a) It is important that applicants submit the required documents sufficiently early to allow for detailed consideration of the application and site inspection if required.

(b) The GCAA cannot undertake to reach a certification decision within a particular timescale or to meet a commercial deadline set by the applicant.

GM1. ADR.OR.C.010 Application for an Aerodrome Certificate

PROMULGATION OF STATUS OF THE AERODROME CERTIFICATE

Upon:

(a) successful issuance of the aerodrome certificate; and

(b) the satisfactory submission of details for the AIP publication by the Aerodrome Operator, as required by the relevant CAR.

The GCAA will promulgate the status of the certificate in the AIP.

GM1 ADR.OR.C.010 Application for an Aerodrome Certificate

AERODROME CERTIFICATE

(Intentionally left blank)

GM2 ADR.OR.C.010 Application for an Aerodrome Certificate

GENERAL - AERODROME NAMING AND ALLOCATION OF ICAO CODE

(a) The naming of an aerodrome is directly connected with aeronautical communications and flight safety information. It is therefore important that aerodrome is representative of its location (the nearest city, town or village) and should not have the potential to be confused with another aerodrome.

(b) Aerodrome operator should apply to the GCAA for assignment of four-letter ICAO code. The decision to assign a code for the aerodrome and get it validated through ICAO will remain with the GCAA and is subject to confirmation by ICAO.

(c) ICAO Document 7910 - Location Identifiers contains codes allocated by national governments on behalf of ICAO, to airports, airfields and other facilities such as ATC and weather stations.

ADR.OR.C.015 Scope of the Aerodrome Certificate

An aerodrome operator shall comply with the scope and conditions of the aerodrome certificate.

ADR.OR.C.020 Continued validity of an Aerodrome Certificate

(a) The GCAA may only grant and permit an aerodrome certificate to continue where it is satisfied that the aerodrome operator can ensure that the aerodrome and its airspace are safe for use by aircraft.

(b) An aerodrome certificate shall remain valid subject to:

(1) the aerodrome operator remaining in compliance with the relevant requirements of this CAR, and other applicable regulations and the aerodrome remaining in compliance with their compliance register;

(2) the satisfactory outcome of regulatory surveillance activities;

(3) the aerodrome operator's handling of findings (as specified under ADR.OR.J.020 -Findings and corrective actions), to the satisfaction of the GCAA;

(4) the GCAA being granted access to the aerodrome operator's organisation as defined in ADR.OR.F.015 -Granting of access, to determine continued compliance with the relevant requirements of this CAR;

(5) the aerodrome operations are conducted within the scope and conditions as detailed in the aerodrome certificate;

(6) the aerodrome certificate not being surrendered or revoked;

(7) payment of all applicable service fees as published by the GCAA.

(c) The validity of the aerodrome certificate is based upon the physical characteristics, type of use of the aerodrome and continued operation in accordance with the GCAA Publications.

(d) Any change made to the physical characteristics as declared in the compliance register , Aeronautical publications, use of the aerodrome, as documented in the aerodrome manual, that is not accepted by the GCAA shall invalidate an Aerodrome Certificate.

(e) Upon revocation or surrender, the aerodrome certificate shall be returned to the GCAA without delay.

ADR.OR.C.025 Amendment to Aerodrome Certificate

Aerodrome operator shall submit the following with any request for amendment in certificate:

(a) detailed account of the proposed amendment including the reasons for the amendment.

(b) an assessment of the safety risks associated with any change in use or operation of the aerodrome including, where appropriate, the findings of any aeronautical study undertaken on behalf of the operator.

(c) particulars of any consequential changes to the AIP, aerodrome manual and aerodrome emergency plan; and

(d) any other request as notified by the GCAA.

GM1 ADR.OR.C.025 Amendment to Aerodrome Certificate

(a) An Aerodrome Certificate may be amended by the GCAA

(1) in response to a request by the aerodrome operator;

(2) as a consequence of enforcement action by the GCAA;

(3) If there is a change in the ownership or management of the aerodrome;

(4) If there is a change in the use or operation of the aerodrome;

(5) If there is a change in the boundaries of the aerodrome.

(b) The GCAA may amend an aerodrome certificate so as to restrict or prohibit specific operations if the operator breaches the scope and conditions of the aerodrome certificate. The GCAA will provide notice of intention to amend an aerodrome certificate stating the reasons for the proposed amendment.

ADR.OR.C.030 Restriction, suspension of revocation of Aerodrome Certificate

Federal Act 20 - Article 27 provides that the GCAA may, on sufficient safety grounds revoke or suspend an aerodrome certificate.

The aerodrome certificate shall be restricted, suspended or revoked by the GCAA , if in the view of the GCAA, the safety of the operations is compromised / no more ensured.

GM1 ADR.OR.C.030 Restriction, suspension of revocation of Aerodrome Certificate

(a) Restriction, suspension or revocation of aerodrome certificate, could be due to non-compliance with the aerodrome certificate requirements or unresolved safety deficiency/concern including inadequate resourcing, and in such cases the GCAA will notify the aerodrome operator in writing of its reasons.

(b) Revocation of an aerodrome certificate may be warranted if the aerodrome operator:

(1) is incapable or unwilling to carry out corrective action or has committed/repeated serious violations; or

(2) has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance; or

(3) falsification of records jeopardizing aviation safety; or

(4) has made it convincingly clear that the continued operation of the aerodrome will be detrimental to the public interest.

ADR.OR.C.035 Transfer of Aerodrome Certificate

(a) The current holder of the aerodrome certificate shall notify the GCAA in writing the following:

(1) before ceasing aerodrome operations of its intention and proposed date to cease operations;

(2) name and details of the proposed transferee.

(b) The proposed transferee shall apply to the GCAA as per the requirements of ADR.OR.C.010 - Application for an aerodrome certificate, as applicable; and

(c) The proposed transferee shall meet the requirements set out in in this CAR

(d) The current holder of the aerodrome certificate and the proposed transferee shall notify the GCAA at least 60 days in advance of the planned transfer date of the aerodrome certificate.

GM1.OR.C.035 Transfer of Aerodrome Certificate

Consent to the proposed transfer may be refused:

(a) if the GCAA is not satisfied that the proposed transferee will be able to operate and maintain the aerodrome properly; or

(b) if significant changes to the operational aspects of the aerodrome will result or will be made by the transferee (e.g. reduction in runway, taxiway or apron facilities; changes in the conditions of the existing certificate unacceptable to the GCAA;

(c) inadequacy or inappropriateness of the new staffing arrangements or significant revisions to the aerodrome manual).

ADR.OR.C.040 Termination of operation

An operator intending to terminate the operation of an aerodrome, shall:

(a) notify the GCAA;

(b) provide such information to the appropriate Aeronautical Information Service provider;

(c) surrender the Aerodrome Certificate to the GCAA upon the date of termination of operation; and

(d) ensure that appropriate measures have been taken to avoid the unintended use of the aerodrome by aircraft, unless the GCAA has approved the use of the aerodrome for other purposes.

AMC1 ADR.OR.C.040 Termination of operation

GENERAL

Upon the termination of the operation, the aerodrome operator should apply closed runway markings as mentioned in CS ADR-DSN. R.855 -Closed runways and taxiways, or parts thereof, as well as any other measure the GCAA has found appropriate.

GM1 ADR.OR.C.040 Termination of operation

The notification should be done at least three months in advance, so as to allow for the timely publication of the changes, and their notification by the Aeronautical Information Regulation and Control (AIRAC) system in accordance with the related timeframe.

SECTION D– LANDING AREA ACCEPTANCE(LAA) (ADR.OR.D)

ADR.OR.D.001 Scope

Unless otherwise specified, the requirements of this subpart are applicable to land and water aerodromes.

ADR.OR.D.005 Obligations for Landing Area Acceptance

Prior to commencing the operation of an aerodrome, the aerodrome operator shall obtain the applicable Landing Area Acceptance issued by the GCAA.

ADR.OR.D.006 Expression of interest for a Landing Area Acceptance

The applicant for a Landing Area Acceptance shall formally inform the GCAA in writing of their interest to develop and operate an aerodrome.

GM1 ADR.OR.C.00D Expression interest for a Landing Area Acceptance

EXPRESSION OF INITIAL INTEREST

(a) The applicant for Landing Area Acceptance should arrange for a meeting with the GCAA and provide details of the proposed aerodrome site as well as concept of operations.

The applicant should make arrangements for its key personnel to be present during this meeting. During this meeting, the applicant should present to the GCAA its plans with regard to the aerodrome.

(b) During the meeting, the applicant may be:

(1) provided by the GCAA with general information about the applicable requirements for the aerodrome to apply and obtain a Landing Area Acceptance;

(2) provided with copies of the applicable requirements, and a description of the procedures that are followed during the Landing Area Acceptance process; and

(3) informed by the GCAA about possible approvals, permits, or clearances that may be needed to be obtained from other authorities.

(c) The GCAA will provide a formal confirmation for the applicant to proceed with a formal application for a Landing Area Acceptance.

ADR.OR.D.010 Application for a Landing Area Acceptance

(a) Pursuant to the United Arab Emirates Federal Act No. 20 (1991) Promulgating The Civil Aviation Law Article 27 and to the Civil Aviation Regulations (CARs) for the time being in force , a Landing Area Acceptance (LAA) may be granted by the GCAA, if it is satisfied that an applicant is competent, having regard to the applicant's previous conduct and experience, the equipment, organisation, staffing, maintenance and other arrangements, to ensure that the aerodrome and airspace are safe for use by aircraft.

(b) The requirement for Landing Area Acceptance is as follows

Aerodromes that are:

(1) not used for air services (LAA may be provided for aerodromes used by light sports aircraft only, for air services);

(2) not available for instrument approaches or departure procedures.

Note:

(1) These aerodromes are characterised as private facilities not available for the general public (excluding areas used solely for light sports aircraft);

(2) An operator of an aerodrome which is not intended for air service operations and does not have instrument approach or departure procedures, may apply for an aerodrome certificate under these regulations;

(3) For aerodromes which are listed as not Air Service operations (with non-instrument runways) and issued with a Landing Area Acceptance, when extending their operations to an Air Service that involve commercial operations or provide operations using instrument approach or departure procedures, then applicants shall apply for an aerodrome certificate, following the requirements of this CAR.

(c) The applicant for a Landing Area Acceptance shall be the operator of the aerodrome who can be:

(1) the owner of the land on which the aerodrome is located;

(2) the occupier of the land on which the aerodrome is located; or

(3) the actual person or organisation operating the aerodrome and holding a formal consent from the owner or occupier of the land on which the facility is located.

(d) The application for an LAA and subsequent document submissions shall be made in a form and manner established by the GCAA that includes no-objections certificates, approvals. Applicant for LAA shall obtain approvals from GCAA in relation to Airspace and all relevant agencies, authorities and entities including those mentioned in AMC2 ADR.OR.D.010(d).

(e) The applicant shall pay the applicable fees.

(f) The applicant shall provide the GCAA with the following:

(1) declaration of compliance and the completed compliance register;

(2) documentation demonstrating how it will comply with the applicable requirements. Such documentation shall include a procedure, contained in the aerodrome manual, describing how changes will be managed and notified to the GCAA; subsequent changes to these procedures shall require prior approval by the GCAA;

(g) Applicant for Landing Area Acceptance shall demonstrate to the GCAA their compliance to the requirements of CAR AGA, their arrangements for safeguarding of area within the OLS and beyond.

(h) The applicant shall satisfy the Landing Area Acceptance requirements at each stage of the application process as detailed in the GM1 ADR.OR.D.010(h).

(i) The applicant of Landing Area Acceptance shall not commence any construction until the design is accepted by the GCAA.

GM1 ADR.OR.D.010(h) Application for a Landing Area Acceptance

LANDING AREA ACCEPTANCE PROCESSING STAGES

Processing stage	Activity	Related AMC/GM
Stage 1	Assessment of application	AMC1 ADR.OR.D.010(c) Relationship of the applicant with the aerodrome owner. GM1 ADR.OR.D.010(c) Registration of the organisation. AMC1 ADR.OR.D.010(d) Information to be provided to the GCAA for design acceptance.

		AMC2 ADR.OR.D.010(d) Other no-objections, approvals and permissions. AMC3 ADR.OR.D.010(d) Meteorological study.
	Payment of fees	AMC1 ADR.OR.D.010(e) Applicable fees.
	Design acceptance	AMC1.ADR.OR.D.010(i) Design acceptance.
Stage 2	Evaluation of the aerodrome manual submitted by the applicant.	AMC1 ADR.OR.D.010 (d)(f) Aerodrome manual ,AEP, SMS.
	Evaluation of the competence and experience of the aerodrome staff.	AMC2 ADR.OR.D.010 (d)(f) Adequacy of structure and resources.
	Assessment of aerodrome physical characteristics, facilities and equipment.	AMC3 ADR.OR.D.010(f) Assessments and evaluations.
	Evaluation of aerodrome operating procedures.	AMC3 ADR.OR.D.010 (f) Assessments and evaluations
	Evaluation of aerodrome operator's SMS.	AMC1 ADR.OR.D.010(d) (f) Aerodrome manual ,AEP, SMS.
	Evaluation of aerodrome emergency plan, rescue and firefighting capabilities.	AMC1 ADR.OR.D.010 (d)(f) Aerodrome manual ,AEP, SMS.
Stage 3	Issuance or refusal of LAA	GM1 ADR.OR.D.010(h) Issuance or refusal of Landing Area Acceptance GM2 ADR.OR.D.010(h) Timescale for processing of applications.

AMC1 ADR.OR.D.010(c) Application for a Landing Area Acceptance

RELATIONSHIP OF THE APPLICANT WITH THE AERODROME OWNER

(a) The applicant should provide the GCAA with all information necessary to demonstrate to the GCAA its relationship with the aerodrome owner, and/or the owner of the land to be used for the aerodrome development.

(b) Such documentation should include, but is not limited to, relevant portions of contracts, lease agreements, authorisations between the persons involved, etc.

GM1 ADR.OR.D.010(c) Application for a Landing Area Acceptance

REGISTRATION OF THE ORGANISATION

(a) Applicant should register their organization in the GCAA's website, in order to make their application through GCAA's e-services or through other means established for this purpose by the GCAA.

(b) Applicants should provide evidence of their identity such as establishment / trade license documentation and official documents as required during the registration process.

(c) Applicant should provide all documents and information as required in the application portal.

(d) Applicants should have secure access to the GCAA e-Services, available on the GCAA's website: www.gcaa.gov.ae. Applicants who do not have access to the GCAA's e-Services must make an initial request through GCAA's customer service channels.

AMC1 ADR.OR.D.010(d) Application for a Landing Area Acceptance

INFORMATION TO BE PROVIDED TO THE GCAA FOR DESIGN ACCEPTANCE

(A) The location of the aerodrome, and its boundaries, including maps and charts to indicate various facilities and area in the aerodrome;

Maps should clearly indicate the aerodrome operational area which include, at least, runways, taxiways, aprons, associated strips, runway end safety areas, stopways, clearways, aerodrome visual aids, fixed aerodrome equipment, other aerodrome operational areas, areas adjacent to the movement area. This defined area will be subject to aerodrome operations safety oversight by the GCAA following the issue of Landing Area Acceptance .

Aerodrome boundary should not be confused with the boundaries established for other purposes, such as fences, the land ownership boundaries used by local planning authorities, or those used to designate security restricted zones ,custom controlled areas, etc.

(b) the type of operations at the aerodrome including:

(1) the aircraft types to be served at the aerodrome, and the critical aircraft type to be used for the design of the aerodrome;
(2) the type of approaches, landing, and/or take-off operations on each runway/FATO;
(3) operations during the day and/or night;
(4) operational concept and the associated airspace;

(5) any limitations to the operation of the aerodrome;

(6) the design and facilities of the aerodrome, in accordance with the applicable certification specifications established by the GCAA;

(7) unmanned aircraft operations including fuelling and charging facilities.

(c) information about the location of the aerodrome - the exact location of the aerodrome should be depicted on a map of a suitable scale acceptable to the GCAA;

(d) drawings in suitable scale , electronic format acceptable to the GCAA should contain:

(1) orientation of Runway(s) / FATOs

(2) the dimensions of the aerodrome's physical characteristics;

(3) the visual and non-visual aids;

(4) the obstacle limitation surfaces, and any other surfaces applicable; and

(5) the aerodrome facilities, installations, and fixed equipment and their location.

(e) description, height, and location of obstacles, in accordance with the applicable aeronautical data requirements (see ADR.OPS. A.005).

(f) The applicant should identify the applicable certification specifications for the design and type of operations of the proposed aerodrome and provide the GCAA with evidence that the proposed design and operation complies with applicable regulations , the applicant should also provide the GCAA with:

(1) the compliance register in the form and manner as established by the GCAA;

(2) the certification specifications for which it proposes to show compliance in a different manner and demonstrate an equivalent level of safety. Such a proposal has to be acceptable to the GCAA. In such cases, the applicant should also propose the method that will be used to demonstrate compliance and achieve an equivalent level of safety, and submit all necessary documentation to support the proposal.

AMC2 ADR.OR.D.010(d) Application for a Landing Area Acceptance

OTHER NO-OBJECTIONS, APPROVALS AND PERMISSIONS

(a) A letter of no objection should be obtained from the appropriate authorities ensuring that the necessary arrangements have been made with regard to the protection of the Obstacle Limitation Surfaces (OLS).

(b) Applicants should obtain required approvals from other Appropriate Authorities (i.e. municipalities, civil defense, local departments of civil aviation.

(c) In addition to the application for a Landing Area Acceptance, other certification or approvals should be required if Air Navigation Services such as ATS, CNS, MET and AIS is to be provided.

(d) Applicants may be required to apply for other certificates or approvals from the GCAA; this will be dependent upon the scale and type of operations the aerodrome is intended to be used. Other areas that require certification or approval are:

(1) Air Navigation Services:

For the purposes of arrangements for Air Navigation services.

(2) Airspace:

For the purpose of ensuring the suitability of the proposed site from an airspace perspective.

(3) Aviation Security:

To confirm that supporting resources and facilities required by aviation security services are made available at airports serving civil aviation.

(e) There may also be other bodies that the applicants should inform in their own interests and it is the responsibility of the aerodrome operator to obtain the appropriate approvals. The application for planning/building permissions and the request for a Landing Area Acceptance are not interdependent and are required to be made separately.

(f) As a part of the Landing Area Acceptance process, the physical characteristics and design should consider, where appropriate, land-use and environmental control measures.

(g) Previously issued approvals, if any, will generally be reassessed each 12 months if there are delays or extended periods of inactivity.

(h) Applicant should have arrangement (MOU or agreement) with the AIS to ensure up-to-date information of aerodrome safety-related conditions are published.

AMC3 ADR.OR.D.010(d) Application for a Landing Area Acceptance

METEOROLOGICAL STUDY

The applicant should have details of the study of the area of the aerodrome, including temperature, visibility, ceiling and wind conditions; moreover, the study should provide information on wind conditions occurring with poor visibility and/or low cloud base at the aerodrome, and their frequency, as well as the accompanying wind direction and speed.

For Meteorological requirements refer to CAR-MET- Meteorological Services.

AMC1 ADR.OR.D.010(i) Application for a Landing Area Acceptance

DESIGN ACCEPTANCE

(a) GCAA's design acceptance is based on the assessment of the information provided by the applicant and is valid for a period of one year. If construction of the aerodrome has not been commenced by that time, the applicant should request for an extension of the design acceptance to ensure that the proposal remains in compliance with GCAA Regulations.

(b) The issue of a design acceptance does not permit the aerodrome to be used for operations until when construction is completed and a Landing Area Acceptance is obtained from the GCAA.

AMC1 ADR.OR.D.010(e) Application for a Landing Area Acceptance

APPLICABLE FEES

Service fees, as published on the GCAA's website are varied from time to time and should be paid to the GCAA:

(a) during the initial Landing Area Acceptance ; and

(b) on a periodic basis after the grant of a Landing Area Acceptance;

for each aerodrome.

Note :Payment of the GCAA's service fee does not guarantee the grant or continuation for aerodrome operations or of a Landing Area Acceptance.

AMC1 ADR.OR.D.010(d)(f) Application for a Landing Area Acceptance

AERODROME MANUAL, AEP, SMS

(a) The manuals mentioned below and their amendments should be submitted to the GCAA in electronic format that allows the GCAA to review, store, and reproduce it.

(1) an electronic version of the aerodrome manual, as required by ADR.OR.B.005 - Aerodrome Manual , including the aerodrome manual checklist.

(2) an electronic version of the Aerodrome Operator's Safety Management System (SMS) manual as required by CAR SMS ,including a SMS manual checklist;

(3) an electronic version of the Aerodrome Emergency Plan (AEP) as required by Part ACM, including an AEP manual checklist;

(b) The GCAA will evaluate and verify if :

(1) the aerodrome manual contains all pertinent information on the aerodrome site, facilities, services, equipment, operating procedures, organization and management;

(2) the Aerodrome Operator's Safety Management System and supporting operating procedures make satisfactory provision for the safety of aircraft;

(3) the aerodrome Rescue Firefighting Service is staffed, trained, equipped, operated and organised to the meet the applicable requirements.

AMC2 ADR.OR.D.010(d)(f) Application for a Landing Area Acceptance

ADEQUACY OF STRUCTURE AND RESOURCES

(a) The applicant should provide all necessary information needed in order to demonstrate to the GCAA that its proposed organisation and management are suitable, and properly matched to the scale and scope of the operation.

(b) Evidence of adequacy of resources to operate the aerodrome in accordance with ADR.OR.A.030- Personnel requirements- Landing Area Acceptance.

(c) The GCAA will assess the operations post holder based on the assessment criteria as established in this CAR.

AMC3 ADR.OR.D.010(f) Application for a Landing Area Acceptance

ASSESSMENTS AND EVALUATIONS

(a) The GCAA's assessments, site visits and inspections will assess inter-alia physical characteristics, visual aids (markings, lights, signs and markers), obstacle environment ;

(b) Before granting a Landing Area Acceptance, the GCAA may verify that:

(1) the aerodrome's facilities, services ,equipment and systems are in accordance with the Civil Aviation Regulations and further to review, inspection or verification audit;

(2) the aerodrome operator's processes and procedures as referenced in the Aerodrome Manual;

(3) the applicant's ability to operate and maintain the aerodrome properly.

(c) The applicant should provide the GCAA, documentation to demonstrate how it will comply with the applicable requirements of this CAR and any other applicable requirements.

GM1 ADR.OR.D.010(h) Application for a Landing Area Acceptance

ISSUANCE OR REFUSAL OF A LANDING AREA ACCEPTANCE

(a) The GCAA will only issue a Landing Area Acceptance, when it is completely satisfied that all regulatory and critical safety elements have been adequately addressed; this may require a further GCAA audit / inspection follow-up visit and / or special additional operating approvals. This includes evidence of any prior approvals or permissions.

(b) The GCAA may impose operating restrictions and/or sanctions at an aerodrome.

(c) After completion of the processing of the application, the GCAA while granting the Landing Area Acceptance, may endorse the conditions of the type of use of the aerodrome and other details as shown in the Landing Area Acceptance.

(d) In the event of non-compliance with the requirements of this CAR or unresolved safety deficiencies/concerns, the GCAA may refuse to grant a Landing Area Acceptance, in such cases, will notify the applicant in writing of its reasons.

GM2 ADR.OR.D.010(h) Application for a Landing Area Acceptance

TIMESCALE FOR PROCESSING OF APPLICATIONS

(a) It is important that applicants submit the required documents sufficiently early to allow for detailed consideration of the application and site inspection if required.

(b) The GCAA cannot undertake to reach a decision within a particular timescale or to meet a commercial deadline set by the applicant.

GM1 ADR.OR.D.010 Application for Landing Area Acceptance

LANDING AREA ACCEPTANCE

(Intentionally left blank)

GM2 ADR.OR.D.010 Application for Landing Area Acceptance

GENERAL - AERODROME NAMING AND ALLOCATION OF ICAO CODE

(a) The naming of an aerodrome is directly connected with aeronautical communications and flight safety information. It is therefore important that aerodrome is representative of its location (the nearest city, town or village) and should not have the potential to be confused with another aerodrome.

(b) Aerodrome operator should apply to the GCAA for assignment of four-letter ICAO code. The decision to assign a code for the aerodrome and get it validated through ICAO will remain with the GCAA and is subject to confirmation by ICAO.

(c) ICAO Document 7910 - Location Identifiers contains codes allocated by national governments on behalf of ICAO, to airports, airfields and other facilities such as ATC and weather stations.

ADR.OR.D.015 Scope of the Landing Area Acceptance

An aerodrome operator shall comply with the scope and conditions of the Landing Area Acceptance.

ADR.OR.D.020 Continued validity of a Landing Area Acceptance

(a) The GCAA may only grant and permit a Landing Area Acceptance to continue where it is satisfied that the aerodrome operator can ensure that the aerodrome and its airspace are safe for use by aircraft.

(b) Unless renewed , a Landing Area Acceptance shall remain valid for a period of three years from the date of issue of a Landing Area Acceptance subject to:

(1) the aerodrome operator remaining in compliance with the relevant requirements of this CAR, and other applicable regulations and the aerodrome remaining in compliance with their compliance register.

(2) the satisfactory outcome of regulatory surveillance activities.

(3) the aerodrome operator's handling of findings as specified under ADR.OR.J.020 -Findings and corrective actions, to the satisfaction of the GCAA;

(4) the GCAA being granted access to the aerodrome operator's organisation as defined in ADR.OR.F.015 -Granting of access, to determine continued compliance with the relevant requirements of this CAR;

(5) the aerodrome operations are conducted within the scope and conditions as detailed in the Landing Area Acceptance;

(6) the Landing Area Acceptance not being surrendered or revoked;

(7) Payment of all applicable service fees as published by the GCAA;

(c) The validity of the Landing Area Acceptance is based upon the physical characteristics, type of use of the aerodrome and continued operation in accordance with the GCAA Publications.

(d) Any change made to the physical characteristics, compliance register or use of the aerodrome, as documented in the aerodrome manual that is not accepted by the GCAA shall invalidate the Landing Area Acceptance.

(e) Upon revocation or surrender, the Landing Area Acceptance shall be returned to the GCAA without delay.

ADR.OR.D.025 Amendment to Landing Area Acceptance

Aerodrome operator shall submit the following with any request for amendment in Landing Area Acceptance:

(a) detailed account of the proposed amendment including the reasons for the amendment;

(b) an assessment of the safety risks associated with any change in use or operation of the aerodrome including, where appropriate, the findings of any aeronautical study undertaken on behalf of the operator;

(c) particulars of any consequential changes to the AIP, aerodrome manual and aerodrome emergency plan; and

(d) Any other request as notified by the GCAA.

GM1 ADR.OR.D.025 Amendment to Landing Area Acceptance

(a) A Landing Area Acceptance may be amended by the GCAA

(1) in response to a formal request by the aerodrome operator;

(2) as a consequence of enforcement action by the GCAA;

(3) If there is a change in the ownership or management of the aerodrome;

(4) If there is a change in the use or operation of the aerodrome;

(5) If there is a change in the boundaries of the aerodrome.

(b) The GCAA may amend a Landing Area Acceptance so as to restrict or prohibit specific operations if the operator breaches the scope and conditions of the Landing Area Acceptance. The GCAA will provide notice of intention to amend a Landing Area Acceptance stating the reasons for the proposed amendment.

ADR.OR.D.030 Restriction, suspension of revocation of Landing Area Acceptance

Federal Act 20 - Article 27 provides that the GCAA may, on sufficient safety grounds revoke or suspend a Landing Area Acceptance.

The Landing Area Acceptance shall be restricted, suspended or revoked by the GCAA , if in the view of the GCAA, the safety of the operations is compromised / no more ensured.

GM1 ADR.OR.D.030 Restriction, suspension of revocation of Landing Area Acceptance

(a) Restriction , suspension or revocation of a Landing Area Acceptance, could be due to non-compliance with the Landing Area Acceptance requirements or unresolved safety deficiency/concern including inadequate resourcing , and in such cases the GCAA will notify the aerodrome operator in writing of its reasons.

(b) Revocation of an aerodrome certificate may be warranted if the aerodrome operator:

(1) is incapable or unwilling to carry out corrective action or has committed/repeated serious violations; or

(2) has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance; or

(3) falsification of records jeopardizing aviation safety; or

(4) has made it convincingly clear that the continued operation of the aerodrome will be detrimental to the public interest.

ADR.OR.D.035 Transfer of Landing Area Acceptance

(a) The current holder of the Landing Area Acceptance shall notify the GCAA in writing the following:

(1) before ceasing aerodrome operations of its intention and proposed date to cease operations;

(2) name and details of the proposed transferee;

(b) The proposed transferee shall apply to the GCAA as per the requirements of ADR.OR.D.10 - Application for a Landing Area Acceptance, as applicable; and

(c) The proposed transferee shall meet the requirements set out in in this CAR.

(d) The current holder of the aerodrome certificate and the proposed transferee shall notify the GCAA at least 60 days in advance of the planned transfer date of the Landing Area Acceptance.

GM1 ADR.OR.D.035 Transfer of Landing Area Acceptance

Consent to the proposed transfer may be refused

(a) if the GCAA is not satisfied that the proposed transferee will be able to operate and maintain the aerodrome properly; or

(b) if significant changes to the operational aspects of the aerodrome will result or will be made by the transferee (e.g. reduction in runway, taxiway or apron facilities; changes in the conditions of the existing certificate unacceptable to the GCAA);or

(c) inadequacy or inappropriateness of the new staffing arrangements or significant revisions to the aerodrome manual).

ADR.OR.D.040 Termination of operation- Landing Area Acceptance

An operator intending to terminate the operation of an aerodrome, shall:

(a) notify the GCAA;

(b) provide such information to the appropriate Aeronautical Information Service provider;

(c) surrender the Landing Area Acceptance to the GCAA upon the date of termination of operation; and

(d) ensure that appropriate measures have been taken to avoid the unintended use of the aerodrome by aircraft, unless the GCAA has approved the use of the aerodrome for other purposes.

AMC1 ADR.OR.D.040 Termination of operation- Landing Area Acceptance

GENERAL

Upon the termination of the operation, the aerodrome operator should apply closed runway markings as mentioned in CS ADR-DSN.R.855-Closed runways and taxiways, or parts thereof, as well as any other measure the GCAA has found appropriate.

GM1 ADR.OR.D.040 Termination of operation- Landing Area Acceptance

The notification should be done at least three months in advance, so as to allow for the timely publication of the changes, and their notification by the Aeronautical Information Regulation and Control (AIRAC) system in accordance with the related timeframe.

SECTION E – CONTRACTING OF ACTIVITIES (ADR.OR. E)

Note : This section is applicable for certified aerodromes only

ADR.OR.E.010 Contracting of activities

(a) When the aerodrome operator decides to contract fully, its activities and/or services (hereby known as the 'contracted activities or services') on a temporary or permanent basis to another organisation (hereby known as (the 'contracted organisation') then it shall be subject to the following requirements:

(1) aerodrome operator shall obtain prior approval from GCAA when activities and/or services are fully contracted to another organisation, on a temporary or permanent basis;

(2) aerodrome operator shall submit to the GCAA the Management of change (see CAR SMS.SA.005 Management of Change) and the transition plan, prior to contracting the activities and/or services to another organisation, on a temporary or permanent basis.

(b) When the aerodrome operator decides to contract portion its activities and/or services (hereby known as the 'contracted activities or services') on a temporary or permanent basis to another organisation (hereby known as the 'contracted organisation') then it shall be subject to the following requirements:

(1) aerodrome operator shall notify the GCAA about its decision to contract a portion of any activities and / or / services on a temporary or permanent basis, that is under the scope of the aerodrome certificate;

(2) aerodrome operator shall submit to the GCAA the Management of change (see CAR SMS.SA.005 Management of Change) and the transition plan, prior to contracting the activities and/or services to another organisation, on a temporary or permanent basis.

(c) The relationship between the aerodrome operator and contracted organisations shall be defined on the service agreement of both organisations and they shall comply with any conditions stated in their respective service agreement.

(d) The aerodrome operator shall within its management system:

(1) have a procedure which includes management of change , transition planning , risk management. performance monitoring and compliance oversight including

i. definition of relevant management responsibilities within its own organisation regarding oversight and monitoring of the contracted organisation;

ii. assurance that the contracted organisation effectively conducts the contracted activities and / or services , and confirms to the applicable requirements; and

iii. assurance that the contracted organisation has implemented appropriate elements of safety management and quality assurance systems including but not limited to mechanisms to remedy any immediate hazards to satisfy and rectify situations that could lower safety standards;

(e) Regardless of their certification status, the contracted organisation shall:

(1) work under the oversight system of the aerodrome operator;

(2) comply with terms of the aerodrome and its certification requirements.

(f) The ultimate responsibility and accountability for the activities and / or services provided by the contracted organisation shall remain with the aerodrome operator.

(g) The aerodrome operator shall ensure that:

(1) all contracted activities and / or services are subject to appropriate elements of safety management and quality assurance system established by the aerodrome operator;

(2) any identified deficiencies and/ or audit findings against the contracted organisation are resolved through the processes as required by the GCAA.

(h) The aerodrome operator shall ensure that the GCAA is given full unrestricted access to the contracted organisation, to determine continued compliance with the applicable requirements.

AMC1 ADR.OR.E.010 Contracted activities

GENERAL - RESPONSIBILITY WHEN CONTRACTING ACTIVITIES

When an aerodrome operator decides to contract fully its activities and/or services to another organisation:

(a) a formal agreement should exist between the aerodrome operator and the contracted organisation, clearly defining the contracted activities and / or services and the applicable

requirements including training and competencies requirements for personnel employed by the contracted organisation where applicable.

(b) the contracted safety related activities and / or services relevant to the agreement should be included in the aerodrome operator's safety management and compliance monitoring programmes;

(c) the aerodrome operator should ensure that the contracted organisation has the necessary resources, authorisation, declaration, or approval when required and commands the resources and competence to undertake the task; to this end, a prior audit of the contracted party should be conducted to ensure that the contracted organisation meets the applicable requirements, and the requirements specified by the aerodrome operator itself.

GM1 ADR.OR.E.010 Contracted activities

RESPONSIBILITY WHEN CONTRACTING ACTIVITIES AND/OR SERVICES

(a) Where contracted activities and/or services involve aircraft movement areas, the aerodrome operator should carry out additional oversight activity to ensure that the activities and/or services are carried out in safe and effective manner.

SECTION F — ADDITIONAL AERODROME OPERATOR RESPONSIBILITIES (ADR.OR.F)

ADR.OR.F.005 Aerodrome operator responsibilities

(a) The aerodrome operator is responsible for the safe operation and maintenance of the aerodrome in accordance with:

(1) CAR AGA and other relevant publications by the GCAA including but not limiting to Safety Decisions, Safety Alerts and any other relevant CARs that are applicable to aerodromes and aerodrome operators;

(2) the standard conditions, scope and specific conditions of aerodrome certificate and landing area acceptance;

(3) the content of the aerodrome manual; and

(4) any other document as applicable.

(b) The aerodrome operator shall ensure directly, or coordinate through arrangements as required:

(1) for providing the air navigation services appropriate to the level of traffic and the operating conditions at the aerodrome;

(2) for Aeronautical Information Service (AIS);

(3) for MET services stated in CAR-MET- Meteorological Services;

(4) for obstacle control; and

(5) aerodrome safeguarding activities, as applicable.

(c) The aerodrome operator shall coordinate with the AIS to ensure that relevant information for the safety of aircraft that is contained in the aerodrome manual is published where appropriate. This shall include:

(1) provisions for which an equivalent level of safety was accepted by the GCAA.

(2) special conditions and limitations with regard to the use of the aerodrome.

(d) If an unsafe condition develops at the aerodrome, the aerodrome operator shall, without undue delay, take all necessary measures to ensure that those parts of the aerodrome found to endanger safety are not used by aircraft.

(e) The aerodrome operator, in order to ensure the safe operation of aircraft at the aerodrome, shall provide and maintain, directly or through arrangements with third parties, appropriate infrastructure, visual and non-visual aids for – navigation, to denote obstacles, restricted use area, meteorological equipment and any other equipment, commensurate with the type of operations conducted at the aerodrome and comply with the specification in this CAR and other relevant CARs.

(f) Aerodrome operators shall stipulate requirements, and ensure that ground handling service providers implement and maintain a Safety Management System that commensurate with the size and complexity of their operation and to actively participate in the aerodrome operator's SMS.

(g) Aerodrome operators shall establish an internal quality assurance system to ensure compliance with, and the adequacy of CAR AGA , Part-ADR , and for the continued improvement of safety levels.

(h) Aerodrome operator shall provide statistical and other operational information as requested by the GCAA.

(i) The aerodrome operator shall require and ensure all the users of the aerodrome including fixed-base operators and organisations which perform activities independently at the aerodrome related to, or in direct support of, the safe operation of aircraft to comply with the requirements laid down by the aerodrome operator with regard to safety and order at the aerodromes, and shall monitor such compliance.

(j) The aerodrome operator shall when necessary for the safety of aircraft operations, establish any limitations on the use of the aerodrome that arise from the aerodrome design or the facilities or

services provided at the aerodrome, which shall be recorded in the aerodrome manual and communicated to the air navigation service provider and aeronautical information services provider.

(k) The aerodrome operator shall ensure that procedures are developed to negate aircraft operators from operating at their aerodrome when such aircraft operators cannot meet the UAE regulatory requirements, or are subject to:

(1) a ban based upon the origin of registry as notified by the GCAA; or

(2) a cease and desist order as notified by the GCAA; or

(3) when the aircraft is subject to a grounding order as notified by the GCAA.

AMC1 ADR.OR.F.005(c) Aerodrome operator responsibilities

INFORMATION TO THE AERONAUTICAL INFORMATION SERVICES AND OTHER ENTITIES

Aerodrome operator should provide without any delay:

(a) a description of cases of equivalent level of safety, special conditions, including limitations with regard to the use of the aerodrome, should be published in the Aeronautical Information Publication (AIP), after coordination with the GCAA;

(b) information to the AIS provider, of any changes in the operational status or availability of the published aerodrome infrastructure.

AMC1 ADR.OR.F.005(i) Aerodrome operator responsibilities

Aerodrome Operators should ensure that they:

(a) maintain their safety responsibilities over safety related activities conducted by those third-party organisations related to, or in direct support of, the safe and secure operation of aircraft;

(b) have the power to access and inspect any third-party organisations providing a service related to, or in direct support of, the safe and secure operation of aircraft operating from the aerodrome including its facilities and records to determine continued compliance with the relevant requirements through safety audits or inspections. The power to access and inspect should be included in the contractual arrangement; and

(c) are able to impose operating restrictions in the event of non-compliance with the applicable safety and security requirements or unresolved safety or security deficiencies or concerns.

AMC1 ADR.OR.F.005(h) Aerodrome operator responsibilities

STATISTICAL AND OTHER OPERATIONAL INFORMATION

The aerodrome operator should also provide the following statistical information to the ICAO with copy to the GCAA:

(a) monthly airport traffic statistics: ICAO Form I should be completed and forwarded via e-mail on a monthly basis;

(b) annual airport traffic statistics: ICAO Form I-S should be completed and forward via e-mail on an annual basis.

GM1 ADR.OR.F.005(h) Aerodrome operator responsibilities

Templates for the ICAO forms are located at https://www.icao.int/sustainability/Pages/eap-sta-excel.aspx; Forms should be sent to stats@aci.aero with a copy to stats@gcaa.gov.ae.

AMC1 ADR.OR.F.005(k) Aerodrome operator responsibilities

OBLIGATIONS TO RESTRICT CERTAIN AIRCRAFT

(a) The aerodrome operator's procedures should include immediate notification to the GCAA of actions taken against such aircraft or aircraft operators.

(b) The aerodrome operator should monitor and ensure that third parties at the aerodrome comply with such procedures.

ADR.OR.F.015 Granting of access

For the purpose of determining compliance with the relevant requirements, an aerodrome operator shall grant access to any person authorised by the GCAA to:

(a) any facility, document, records, data, procedures or any other material relevant to its activity subject to certification or declaration, whether it is contracted or not; and

(b) perform or witness any action, inspection, test, assessment or exercise that the GCAA finds as necessary.

ADR.OR.F.030 Occurrence reporting

(a) The aerodrome operator shall establish procedures for the notification, investigation, and reporting of safety events to the GCAA and adhere to the requirements established in CAR OCR.

(b) The aerodrome operator shall report to the GCAA, any accident, serious incident and occurrences. In accordance with CAR OCR.

(c) Without prejudice to point (b), the aerodrome operator shall report to the GCAA, any malfunction, technical defects, exceeding of technical limitations, occurrence or other irregular circumstances that has or may have endangered the safety of the operations and that has not resulted in an accident or serious incident.

(d) Aerodrome operators shall establish procedures to carry out investigation as defined in CAR SMS.

AMC1 ADR.OR.F.030 Occurrence reporting

GENERAL- REPORTING PROCEDURES

The aerodrome operator should establish procedures to be used for reporting to the GCAA, as required, which include at least:

(a) the description of the applicable requirements for the purpose of reporting;

(b) the description of the reporting mechanism, including reporting forms, means, and deadlines;

(c) the personnel responsible for reporting; and

(d) the description of the mechanism and personnel responsibilities for identifying root causes, and the actions that may be needed to be taken to prevent similar occurrences from happening in the future, as appropriate.

AMC1 ADR.OR.F.030 (b)(c) Occurrence reporting

REPORTING OF INCIDENT TO THE GCAA

(a) The Aerodrome Operator should submit all reportable occurrences as defined in CAR OCR or unless specific alternative provisions are requested by the GCAA.

(b) Reports should be made via the GCAA ROSI (Reporting of Safety Incident) System applicable to aerodromes and/or any other reporting system as established by the GCAA.

(c) Reports should be made as soon as possible and in any case within the relevant notification period defined in CAR OCR, unless otherwise instructed by the GCAA.

AMC2 ADR.OR.F.030 (b)(c)Occurrence reporting

WILDLIFE STRIKE REPORTING

In the event of a wildlife strike including bird strike, the Aerodrome Operator should use the ROSI system or any other system as established by the GCAA to make mandatory reports to the GCAA.

ADR.OR.F.031 Voluntary reporting system

An aerodrome operator shall establish a system to educate their personnel of how to report an actual or potential safety deficiency through the GCAA's Voluntary Reporting System (VORSY).

GM1 ADR.OR.F.031 Voluntary reporting system

It is recognised that a mature safety culture will support healthy internal reporting and will rarely require issues to be raised external to the organisation. Nevertheless, there should be no documentation, publication, or actions that discourage, directly or indirectly, the use of the VORSY external reporting system.

ADR.OR.F.040 Prevention of fire

(a) The aerodrome operator shall establish procedures to prohibit:

(1) smoking within the movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material is stored;

(2) display of an open flame or undertaking of an activity that would create a fire hazard within:

(i) areas of the aerodrome where fuel or other flammable material is stored;

(ii) the movement area or other operational areas of the aerodrome, unless authorised by the aerodrome operator.

(b) The aerodrome operator shall establish a fire prevention plan that:

(1) commensurate with the types of aircraft operations and other activities at the aerodrome;

(2) include sufficient trained and competent personnel, equipment and facilities to implement the plan;

(3) contain sufficient procedures for the identification, control and prevention of fire hazards at the aerodrome;

(4) contain sufficient procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness; and

(5) comply with all relevant requirements of Part ACM.

ADR.OR.F.055 Airport design and master plan

(a) A master plan containing detailed plans for the development of aerodrome infrastructure shall be established for aerodrome.

(b) The master plan shall:

(1) contain a schedule of priorities including a phased implementation plan; and

(2) be reviewed periodically to consider current and future aerodrome traffic.

(c) The design of aerodromes shall consider, where appropriate land-use, and environmental control measures and aerodrome land reserves, safeguarding measures.

(d) Architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures shall be integrated into the design and construction of new facilities and alterations to existing facilities at an aerodrome.

(e) Aerodrome stakeholders, particularly aircraft operators, air navigation service providers, should be consulted in order to facilitate the master planning process using a consultative and collaborative approach.

GM1 ADR.OR.F.055 Airport design and master plan

(a) A master plan for the long-term development of an aerodrome displays the ultimate development in a phased manner and reports the data and logic upon which the plan is based. Master plans are prepared to support modernization of existing aerodromes and creation of new aerodromes, regardless of size, complexity, and role. It is important to note that a master plan does not constitute a confirmed implementation programme. It provides information on the types of improvements to be undertaken in a phased manner.

Note 1: Provision of advanced planning data to facilitate the planning process include future aircraft types, characteristics and numbers of aircraft expected to be used, the anticipated growth of aircraft movements, number of passengers and amount of cargo projected to be handled.

Note 2: Guidance in Annex 9, Chapter 6 on the need for aircraft operators to inform aerodrome operators concerning the former's service, schedule and fleet plans to enable rational planning of facilities and services in relation to the traffic anticipated.

Note 3: Guidance in ICAO's Policies on Charges for Airports and Air Navigation Services Doc 9082), Section 1, regarding consultation with users concerning provision of advance planning data and protection of commercially sensitive data.

(b) A master plan should represent the development plan of a specific aerodrome. It should be developed based on economic feasibility, traffic forecasts, current and future requirements provided by, among others, aircraft operators;

(c) After completing the master plan, the concerned organisation must then take the broad guidelines of the master plan and translate them into a programme that recognizes the specific airport constraints and opportunities presented. This programme would typically be translated into a 5-year capital investment programme as part of a larger 10-year rolling capital plan in close consultation with airport users;

(d) To ensure a realistic and appropriate fit to continuously evolving aviation industry conditions, the master plan should be reviewed in its entirety every 5 years, or more often if changes in economic, operational, environmental and financial conditions warrant an earlier revision. Adjustments may need to be made to assumptions used during the initial master plan process, including phasing and ongoing airfield and facility development as air transport evolves.

(e) A master plan represents the development plan of a specific aerodrome . It is developed by the aerodrome operator based on economic feasibility, traffic forecasts, and current and future requirements provided by, among others, aircraft operators.

(f) A master plan may be required when the lack of capacity at an airport, due to conditions such as, but not limited to expected traffic growth, changing weather and climatic conditions or major works to address safety or environmental concerns, would put the connectivity of a geographical area at risk or cause severe disruption to the air transport network.

SECTION G — MANAGEMENT (ADR.OR.G)

ADR.OR.G.005 Management system

(a) The aerodrome operator holding an aerodrome certificate shall implement and maintain a management system including a safety management system ,to comply with all the requirements of CAR SMS (Safety Management System) and a Quality Assurance system.

(b) The management system shall include:

(1) clearly defined lines of responsibility and accountability throughout the aerodrome operator, including a direct accountability for safety on the part of senior management;

(2) a description of the overall principles and policies of the aerodrome operator with regard to safety, referred to as the safety policy, signed by the accountable manager;

(3) a formal process that ensures that hazards in operations are identified and reported;

(4) a formal process that ensures analysis, assessment and mitigation of the safety risks in aerodrome operations and remedial actions necessary to maintain acceptable level of safety is implemented;

(5) the means to verify the safety performance of the aerodrome operator's organisation in reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls;

(6) a formal process to:

(i) identify and manage changes within the aerodrome operator's organisation, management system, the aerodrome or its operation which may affect established processes, procedures, services and aircraft operations;

(ii) describe the arrangements to ensure safety performance before implementing changes; and

(iii) eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment;

(7) a formal process to review the management system referred to in paragraph (a), identify the causes of substandard performance of the safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes;

(8) a safety training programme that ensures that personnel involved in the operation, rescue and firefighting, maintenance and management of the aerodrome are trained and competent to perform the safety management system duties;

(9) formal means for safety communication that ensures that personnel are fully aware of the safety management system, conveys safety critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed;

(10) coordination of the safety management system with the aerodrome emergency response plan; and coordination of the aerodrome emergency response plan with the emergency response plans of those organisations it must interface with during the provision of aerodrome services; and

(11) a formal process to monitor compliance of the organisation with the relevant requirements.

(c) The aerodrome operator shall document all management system key processes.

(d) The management system shall be proportionate to the size of the organisation and its activities, taking into account the hazards and associated risks inherent in these activities.

(e) The aerodrome operator shall organise, coordinate and implement safety programmes to promote safety at the aerodrome. Such programmes should include, but are not limited to:

(1) runway, taxiway safety and incursion prevention;

(2) apron safety; and

(3) FOD prevention;

AMC1 ADR.OR.G.005(a) Management system

THE QUALITY ASSURANCE SYSTEM

(a) Aerodrome operator should establish a quality assurance system that is:

(1) continual, incorporating inspections, audits, and reviews to assess the adequacy of controls in key programmes and systems;

(2) ongoing, identifying deficiencies, developing corrective and preventive action plans to correct those deficiencies, and performing follow-up reviews.

AMC2 ADR.OR.G.005(a) Management system

(a) Aerodrome operators holding Landing Area Acceptance should endeavour to comply with ADR.OR.G.005 Management system (a) and shall in any case implement and maintain a management system that commensurate with the size of its operations and acceptable to the GCAA.

(b) The aerodrome operator holding a Landing Area Acceptance:

(1) may replace the safety review board with any other appropriate forums;

(2) may include SMS as a component of the aerodrome manual.

GM1 ADR.OR.G.005(a) Management system

THE QUALITY ASSURANCE SYSTEM

(a) The GCAA encourages organisations to extend their quality assurance system beyond regulatory compliance to determine the areas needing enhancement in operations. Based on these determinations organisations can enhance operating practices before deficiencies occur and help embed an organisational culture which prioritises continuous improvement.

(b) the most effective QMSs are those where all staff, not only management and the Quality Assurance (QA) team, understand the QMS, its importance and their role in maintaining it.

All staff and managers have a part to play in ensuring that an organisation's policies and procedures provide for safety compliance, meet quality standards and allow individuals to perform work properly. This is achieved by continuously monitoring an organisation's performance and safety standards as part of normal work activities and ensuring that operations are safe and in compliance with the rules.

(c) Aerodrome operator's Internal quality assurance system does not replace GCAA's monitoring activities.

AMC3 ADR.OR.G.005(a) Management system

(a) Aerodrome operator should identify a person or a group of people, within the organisation, with the responsibility and authority to:

(1) develop, implement and maintain the QMS;

(2) manage the organisation's internal audit programme;

(3) identify and record any findings or concerns, and the evidence necessary to confirm findings or concerns;

(4) initiate, recommend, or provide solutions to findings or concerns through consultation with the management owning the non-conforming process or activity;

(5) communicate and co-ordinate activities with external auditors;

(6) analyse the root causes of concerns and findings for presentation to management for a review of trends and potential areas of concern, and

(7) conduct and record regular management reviews to ensure corrective and preventive actions are addressed and closed out within a specific time.

(b) Aerodrome operator should develop, measure and monitor their own quality indicators.

Some examples of typical quality indicators are:

(1) reports derived from the analysis and investigation of operational logs and records kept of incidents, occurrences, accidents, and other safety indicators;

(2) root cause analysis from corrective and preventive action records;

(3) performance measurements of both the QMS and the organisation's operation;

(4) customer complaints, and/ or;

(5) customer surveys, external and internal.

(c) Quality assurance procedures should:

(1) be concise and complete enough to be a useful guide for a user with the appropriate skills to perform the task(s) within the procedure;

(2) state specifically how the organisation will address and meet the requirements of rules, relevant legislation and regulations, or other regulatory requirements;

(3) be current and meet the requirements of referenced document(s);

(4) be accessible to all users of the process.

GM2 ADR.OR.G.005(a) Management system

SMS AND QMS

(a) SMS and QMS share a number of common purposes and processes:

(1) both depend upon measuring and monitoring;

(2) both strive for continuous improvement;

(3) both use some of the same tools, such as auditing and review.

(b) However, a QMS does not include all the elements, features and activities of an SMS, as it focuses mainly on compliance, conformance and monitoring. SMS goes further and requires the organisation to identify and manage risk to achieve an acceptable level of safety performance. It is not so much a case of replacing QMS by SMS, but instead, realising that they are complementary and inextricably linked. An effective SMS can be built by applying QMS principles.

GM3 ADR.OR.G.005(a) Management system

COMPONENTS OF-QUALITY ASSURANCE SYSTEM

Main components of a QMS

(a) Quality Control Planning - Identifying quality goals and standards, the requirements necessary to meet them, and the procedures to be used to check that they are being met;

(b) Quality Control - Physically inspecting and testing what was laid out in the planning stage to make sure it is meets the desired outcomes;

(c) Internal Quality Assurance (IQA) - Reviewing the delivery process of services or the quality management of operations, and

(d) Quality Improvement- Thoroughly reviewing the findings from the above three components, with the aim of improving methods in the future.

AMC1 ADR.OR.G.005(b)5 Management system

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

The aerodrome operator should define levels of safety that should be expressed in the following two terms:

(a) Safety Performance Indicators;

(b) Safety Performance Targets.

Safety Performance Targets should be supported by an action plan.

AMC2 ADR.OR.G.005(b)(5) Management system

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

An Aerodrome Operator should establish defined levels of safety for the following safety events:

Accidents and incidents involving aircraft on the ground including, but not limited to the following:

(a) Runway Incursion - CAT A/CAT B;

(b) Runway Incursion - CAT C/CAT D;

(c) Manoeuvring Area Excursion - CAT A/CAT C (related to Runway);

(d) FOD incident resulting in aircraft damage (any category);

(e) Aircraft Damage - CAT A/CAT B;

(f) Accidents and incidents involving airside ground vehicles;

(g) Runway friction measurements;

(h) AGL reliability;

(i) FOD found on airport pavements and runway/taxiway strip areas;

(j) Bird and wildlife strike with aircraft (Bird & Wildlife Hazard - CAT A/CAT B); and

(k) Fuel spills and fuel handling accidents and incidents.

AMC3 ADR.OR.G.005(b)(5) Management system

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

Aerodrome Operator should define periodic safety performance targets for each of the following incident classifications:

(a) Runway Incursions - CAT A/CAT B;

(b) Runway Incursion - CAT C/CAT D;

(c) Manoeuvring Area Excursion - CAT A/CAT C (related to Runway); and

(d) FOD Incident resulting in Aircraft Damage (any category).

AMC4 ADR.OR.G.005(b)(5) Management system

MONTHLY SAFETY ASSESSMENT

Aerodrome operators should conduct a monthly safety performance assessment and forward to the GCAA by the last day of the month the following the end of each reporting month. The assessment should contain as a minimum:

(a) Monthly traffic movement;

(b) The status of the current safety performance and alert levels;

(c) Identification of risk elements within those incidents related to safety performance indicators and targets;

(d) Aerodrome operator's response to any breached alert level, and

(e) A summary of actions taken to maintain or improve safety performance and a review of the effectiveness of any actions in progress relating to the measured risks.

AMC5 ADR.OR.G.005(b)(5) Management system

ANNUAL SAFETY ASSESSMENT

An annual assessment should be conducted that contains as a minimum:

(a) a summary of the monthly elements required;

(b) an evaluation of the controls implemented to manage safety performance and identified risks;

(c) a summary of actions taken to maintain or improve safety levels and a timeline for implementation of identified improvements.

AMC1 ADR.OR.G.005(b)(10) Management system

COORDINATION OF THE AERODROME EMERGENCY RESPONSE PLAN

The coordination of the aerodrome emergency response plan, established in accordance with the requirements contained in this CAR, with the safety management system, should ensure continuous improvement of the systems and procedures contained within the plan.

GM1 ADR.OR.G.005(b)(10) Management system

COORDINATION OF THE AERODROME EMERGENCY RESPONSE PLAN

Continuous improvement of the systems and procedures contained within the aerodrome emergency response plan may, amongst others, be obtained by:

(a) conducting a review of the relevant parts of the emergency response plan after a full or partial exercise;

(b) debriefing and analysing the emergency response operations after an emergency situation; and

(c) developing new emergency procedures or systems as part of the emergency response plan when new hazards are identified by the safety management system, to ensure, amongst others, the coordination with the emergency response plans of other interfacing organisations.

AMC1 ADR.OR.G.005(b)(11) Management system

COMPLIANCE MONITORING

(a) Compliance monitoring

(1) The implementation and use of a compliance monitoring process should enable the aerodrome operator to monitor compliance with the relevant requirements of CAR AGA, as well as any other applicable regulatory requirements, or requirements established by the aerodrome operator and to that effect:

(i) the aerodrome operator should specify the basic structure of the compliance monitoring applicable to the activities conducted;

(ii) the compliance monitoring should be properly implemented, maintained and continually reviewed and improved as necessary;

(iii) compliance monitoring should be structured according to the size of organisation and to include the activities and services for which the aerodrome operator is responsible as required in CAR AGA, including those which have been subcontracted;

(iv) compliance monitoring should include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary.

(2) An aerodrome operator should monitor conformance with the procedures it has designed, to ensure safe activities. In doing so, an aerodrome operator should as a minimum, and where appropriate, monitor compliance with:

(i) Scope of the certificate;

(ii) manuals, logs, and records;

(iii) training standards;

(iv) required resources; and

(v) management system procedures and manuals.

(b) Organisational set-up

(i) A person should be responsible for compliance monitoring. The accountable manager, with regards to his/her direct accountability for safety, should ensure that sufficient resources are allocated for compliance monitoring;

(ii) The independence of the compliance monitoring should be established by ensuring that audits and inspections are carried out by personnel not responsible for the function, procedure, etc. being audited;

(iii) Personnel involved in compliance monitoring should have access to any part of the aerodrome organisation, and any contracted organisation as required.

(c) Compliance monitoring documentation

(1) Relevant documentation should include the relevant part(s) of the aerodrome operator's management system documentation;

(2) In addition, relevant documentation should also include the following:

(i) terminology;

(ii) SOP(s);

(iii) a description of the organisation of the aerodrome operator;

(iv) the allocation of duties and responsibilities;

(v) procedures to ensure regulatory compliance;

(vi) the compliance monitoring programme, reflecting:

(A) schedule of the monitoring programme;

(B) audit procedures;

(C) reporting procedures;

(D) follow-up and corrective action procedures; and

(E) recording system;

(vii) the training syllabus referred to in (d)(2); and

(viii) document control.

(d) Training

(1) Correct and thorough training is essential to optimise compliance .In order to achieve significant outcomes of such training, the operator should ensure that all personnel understand the objectives as laid down in the operator's management system documentation;

(2) Those responsible for managing the compliance monitoring should receive training on this task. Such training should cover the requirements of compliance monitoring, manuals and procedures related to the task, audit techniques, reporting, and recording. Audits should be carried out by trained auditing personnel who are independent of those having direct responsibility for the activity being audited;

(3) Time should be provided to train the personnel involved in compliance management, and for briefing the remaining of the personnel;

(4) The allocation of time and resources should be based on the volume and complexity of the activities concerned.

(e) Compliance monitoring — audit scheduling

(1) A defined audit schedule to be completed during a specified calendar period and a periodic review cycle for each area for which the aerodrome operator is responsible should be established. The programme should allow for unscheduled audits when trends indicating safety concerns are identified. Follow-up audits should be scheduled to verify that corrective action was carried out, and that it was effective and completed, in accordance with the policies and procedures specified in the aerodrome manual;

(2) The aerodrome, its management system key processes, procedures and its operation should be audited within the first 12 months since the date of the issuance of the certificate;

(3) After that, the aerodrome operator should consider the results of its safety (risk) assessments and of its past compliance monitoring activities, in order to adapt the calendar period within which an audit or a series of audits should be conducted, to cover the whole aerodrome, its

management system key processes, procedures and its operation in a manner, and at intervals set out in the aerodrome manual;

(4) Ensure the results of audits are shared with the personnel responsible for the activity being audited;

(5) Required preventive or corrective action to be taken by the personnel responsible for the activity being audited if findings (or) area of enhancement are found by the audit;

(6) Ensure all audit findings and observations are evidenced and properly recorded;

(7) Management review procedures that should include the use of statistical analysis, to ensure the continuing suitability and effectiveness of the quality assurance system in satisfying the requirements of this regulations.

AMC2 ADR.OR.G.005(b)(11) Management system

RESPONSIBILITY FOR COMPLIANCE MONITORING

(a) The responsibility for the compliance monitoring should be with the Quality Post Holder who has direct access to, and is responsible to the Accountable Manager.

(b) Persons allocated the responsibility for the compliance monitoring should have:

(1) adequate experience and expertise in aerodrome operations;

(2) adequate knowledge of, and experience in safety management and quality assurance;

(3) knowledge of the aerodrome manual; and

(4) comprehensive knowledge of the applicable requirements of this CAR and associated ICAO documents.

GM1 ADR.OR.G.005(b)(11) Management system

RESPONSIBILITY FOR COMPLIANCE MONITORING

(a) In case of LAA, the responsibility for compliance monitoring can be carried out by competent and suitable person.

(b) In case external personnel are used to perform compliance audits or inspections:

(1) any such audits or inspections are performed under the responsibility of the quality Post Holder; and

(2) the quality Post Holder remains responsible for ensuring that the external personnel have relevant knowledge, background and experience as appropriate to the activities being audited or inspected, including knowledge and experience in compliance monitoring.

The quality Post Holder retains the ultimate responsibility for the effectiveness of the compliance monitoring function, in particular for the effective implementation and follow-up of all corrective actions.

AMC1 ADR.OR.G.005(c) Management system

AERODROME OPERATOR MANAGEMENT SYSTEM DOCUMENTATION

The aerodrome operator should ensure that the documented management system key processes include a process for making personnel aware of their responsibilities, as well as its amendment procedure.

The aerodrome operator's management system documentation should, at least, include the following information:

(a) a statement signed by the Accountable Manager to confirm that the aerodrome operator will continuously work in accordance with the applicable requirements and the operator's documentation;

(b) the aerodrome operator's scope of activities;

(c) the titles and details of persons referred to in ADR.OR.A.025 and ADR.OR.A.030 – Personnel requirements;

(d) an organisation chart showing the lines of responsibility between the Post Holders;

(e) procedures specifying how the aerodrome operator ensures compliance with the applicable requirements;

(f) the amendment procedure for the operator's management system documentation; and

(g) safety management system outputs.

AMC2 ADR.OR.G.005(c) Management system

AERODROME OPERATOR'S SAFETY MANAGEMENT MANUAL

(a) The Safety Management Manual (SMM), should be the key instrument for communicating the approach to safety for the aerodrome operator.

(b) The SMM should document all aspects of safety management, including the safety policy, objectives, procedures, and individual safety responsibilities.

GM1 ADR.OR.G.005(f) Management system

The aerodrome operator holding a Landing Area Acceptance:

(a) may replace the safety review board with any other appropriate forums;

(b) may include SMS as a component of the aerodrome manual.

ADR.OR.G.007 Management of aeronautical data and aeronautical information

As part of its management system, the aerodrome operator shall implement and maintain a quality management system covering the following activities:

(1) its aeronautical data activities;

(2) its aeronautical information provision activities.

GM1 ADR.OR.G.007 Management of aeronautical data and aeronautical information

QUALITY MANAGEMENT SYSTEM FOR AERONAUTICAL DATA AND AERONAUTICAL INFORMATION PROVISION ACTIVITIES

(a) An aerodrome operator does not need to duplicate functions and activities in order to discharge the responsibilities related to the management of aeronautical data and aeronautical information provision activities.

(b) In this respect, the compliance monitoring may be used for the purposes of ensuring compliance with the relevant requirements for management of aeronautical data and aeronautical information provision activities.

AMC1 ADR.OR.G.007 Management of aeronautical data and aeronautical information

Protection of electronic aeronautical data while stored or in transit should be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical and essential aeronautical data as classified in ADR.OPS.A.010 - Data quality requirements.

AMC2 ADR.OR.G.007 Management of aeronautical data and aeronautical information

Aerodrome operator shall have procedures to ensure that aeronautical data submitted to the Aeronautical Information Service as part of the Integrated Aeronautical Information Package, is at any moment:

(a) checked and coordinated with relevant parties before it is submitted to the Aeronautical Information Service, in order to make certain that all necessary information has been included and that it is correct in detail .

(b) traceable to its origin to allow any data anomalies or errors, detected during production/maintenance phases or in operational use, to be corrected; and

(c) validated and verified to ensure that quality requirements (accuracy, resolution, integrity) and traceability of aeronautical data as specified in this CAR are met.

ADR.OR.G.017 Training and proficiency check programmes

See CAR AGA, Part TRG

ADR.OR.G.020 Facilities requirements

(a) The aerodrome operator shall ensure that adequate and appropriate facilities are available to its personnel or personnel employed by parties with whom it has contracted for the provision of aerodrome operational and maintenance services.

(b) The aerodrome operator shall designate appropriate areas at the aerodrome to be used for the storage of dangerous goods transported through the aerodrome, in accordance with the Technical Instructions.

ADR.OR.G.025 Coordination with other organisations

The aerodrome operator shall:

(a) ensure that the management system of the aerodrome addresses the coordination and interface with the safety procedures of other organisations operating or providing services at the aerodrome; and

(b) ensure that such organisations have safety procedures in place to comply with the applicable requirements of this CAR and the requirements laid down in the aerodrome manual.

GM1 OR.G.025 Coordination with other organisations

COORDINATION OF SAFETY PROCEDURES

Coordination and interface with the safety procedures of other relevant organisations that are active at the aerodrome include, but is not limited to the following:

(a) aircraft operators;

(b) air navigation service providers;

(c) providers of apron management services;

(d) ground handling service providers;

(e) providers of services to persons with reduced mobility;

(f) aircraft maintenance organisations;

(g) flying training organisations;

(h) government authorities that operate on the movement area;

(i) as well as other organisations that perform activities independently at the aerodrome.

ADR.OR.G.027 Safety programmes

The aerodrome operator shall:

(a) establish, lead and implement programmes to promote safety and the exchange of safety- relevant information; and

(b) require organisations operating or providing services at the aerodrome to be involved in such programmes.

AMC1 ADR.OR.G.027(a) Safety programmes

SAFETY PROGRAMMES — AERODROME SAFETY COMMITTEES

(a) The aerodrome operator should:

(1) organise, coordinate and implement programmes to promote safety at the aerodrome. Such programmes should include, but are not limited to:

(i) runway safety, including runway incursion and excursion prevention;

(ii) taxiway safety, including taxiway incursion prevention, apron safety; and

(iii) FOD prevention;

(2) coordinate and promote the exchange of information, and the joint investigation of occurrences, serious incidents, and accidents.

(b) The aerodrome operator should establish, coordinate, and lead the local aerodrome safety committees, and a Local Runway Safety Team, dealing with runway safety, taxiway safety, apron safety, and the safety of the operations at the aerodrome in general. All relevant organisations operating or providing services at the aerodrome should participate in such aerodrome safety committees and the Local Runway Safety Team;

The local aerodrome safety committees and the Local Runway Safety Team should convene regularly, identify and review local safety issues, and examine possible solutions, and need for action. Minutes of such meetings should be kept. Procedures relevant to the functioning of local aerodrome safety committees and the Local Runway Safety Team should be included in the aerodrome manual;

(c) Proactive measures should be taken by aerodrome operators to reduce the likelihood of a runway incursion occurring at their aerodrome and to raise awareness of the hazards associated with runway incursions to all aerodrome users. Aerodrome Operators should regularly review those areas of their aerodrome Safety Management System relevant to the effectiveness and adequacy of the prevention measures in place at their aerodrome.

GM1 ADR.OR.G.027(a) Safety programmes

SAFETY PROGRAMMES —AERODROME SAFETY COMMITTEES

(a) Establishment of safety committees

Notwithstanding the establishment of a Local Runway Safety Team , The aerodrome operator should also establish safety committees that takes into considering , Runway , taxiway, Apron safety.

(b) Management of safety committees

The Safety Committees should be chaired by an aerodrome operator's official, responsible for aerodrome operations.

(c) Composition of Safety Committees should include, but not limited to representatives of:

(1) airlines;

(2) aircraft ground handling services providers;

(3) aerodrome operator;

(4) air navigation service provider(s).

(d) Tasks

The tasks of the Safety Committees should be:

(1) to receive and evaluate reports on operational safety issues;

(2) to receive reports and statistical information on accidents and incidents, and propose solutions;

(3) to advise on manoeuvring area/apron safety issues such as:

(i) promotion of apron safety discipline;

(ii) FOD prevention;

(iii) developing measures for safe operations;

(iv) considering actions to resolve manoeuvring area/apron safety problems;

(v) apron equipment issues;

(vi) adherence to vehicle traffic issues;

(vii) new and/or updated safety instructions;

(viii) personal protective clothing/equipment issues;

(ix) methods to develop and promote apron safety awareness initiatives;

(x) proposed aerodrome works;

(xi) proposed changes/developments to the movement area;

(xii) standard operating procedures, etc.

AMC2 ADR.OR.G.027(a) Safety programmes

LOCAL RUNWAY SAFETY TEAM

(a) Context

As part of its runway safety programme, the aerodrome operator should establish and lead a Local Runway Safety Team and act on local runway safety issues, including runway incursion and excursion prevention.

(b) Local Runway Safety Team composition

Participation should include representatives from all interested parties with direct involvement in runway operations at the aerodrome, including, but is not limited, to:

(1) aerodrome operations;

(2) aerodrome engineering and maintenance;

(3) air navigation service providers;

(4) aircraft operators that operate at the aerodrome;

(5) aerodrome rescue and firefighting services;

(6) pilot representation;

(c) Role

The role of the Local Runway Safety Team should be to advise the appropriate management on potential runway safety issues, and to recommend mitigating measures.

(d) Tasks

The Local Runway Safety Team may have the following tasks:

(1) identification of potential runway safety issues, including the need for establishment of hot spots or other problem areas at the aerodrome and the review of the relevant entries of the AIP for accuracy;

(2) developing and running local awareness campaigns, at suitable periods, including at the start of a busy season or before an unusual event, that focus on local issues, for example, producing and distributing local hot spot maps, or other guidance material considered as necessary; local awareness campaigns should be periodically refreshed to maintain interest and operational awareness of the relevant personnel;

(3) monitoring the number, type and, the severity of runway incursions; disseminating safety recommendations delivered from accident and incident investigation findings as well as other relevant lessons learned e.g. from operational experience and best risk mitigation practices; sharing good practices to prevent runway incursions or excursions;

(4) assisting in verifying that communications between air traffic controllers, or other Air Traffic Services personnel, pilots, and vehicle drivers are satisfactory, or if any improvements could be suggested;

(5) making observations on a regular basis in different weather and visibility conditions to assess: if all runway entrances and visual aids are adequate, correctly located and understandable by all parties concerned, with no possible ambiguity of their meaning, or identify potential aerodrome design issues;

(6) understanding the operating difficulties of personnel working in other areas, and recommending areas for improvement; when reviewing operating procedures, it is necessary to ensure that the procedures employed by different companies at the aerodrome are integrated and effective, so as to minimise the risk of runway incursions. Care should be taken when examining existing or proposed runway capacity enhancing procedures or noise abatement schemes involving runway preferential systems;

(7) provide inputs for the development of joint, initial and recurrent, training programmes and familiarisation on runway incursion and excursion prevention, for all relevant personnel (vehicle drivers and other personnel operating on the manoeuvring area, pilots, Air Traffic Services personnel); this may include visits to the manoeuvring area to increase awareness of

the aerodrome layout, markings, signs, position of anemometers etc., where this is considered necessary;

(8) providing advice prior to the implementation of changes to the aerodrome, practices and procedures to identify potential for runway incursion or excursion;

(9) assessing the effectiveness of implemented operational solutions periodically;

(10) development of joint training programmes on runway incursion prevention;

(11) monitor the number, type and severity of runway safety events including incursions and excursions; and

(12) periodically review airfield compliance issues, alternative means of compliance or deviations related to the runway;

(13) review aerodrome charts showing hotspots for accuracy and revisions;

(14) develop strategies to manage and mitigate the risk from hot spots, depending on the case and may include but not limiting to:

(i) additional visual aids, if necessary;

(ii) establishing alternate routes;

(iii) introducing changes to the design parts of the aerodromes; and

(iv) the mitigation of blind spots in the aerodrome control tower.

GM2 ADR.OR.G.027(a) Safety programmes

Further guidance materials on the on the composition and activities of an effective runway safety can be found in

(a) ICAO Runway Safety Hand Book;

(b) European Action Plan for the Prevention of Runway Excursions (EAPPRE)- Appendix A Guidelines for Local Runway Safety Teams;

(c) European Action Plan for the Prevention of Runway Incursions (EAPPRI).

AMC3 ADR.OR.G.027(a) Safety programmes

HOT SPOTS

Once hot spots have been identified at an aerodrome, suitable strategies should be implemented to remove the hazard and, when this is not immediately possible, to manage and mitigate the risk, including the publication of hot spot charts in the Aeronautical Information Publication.

GM3 ADR.OR.G.027(a) Safety programmes

HOT SPOTS

Strategies to manage and mitigate the risk from hot spots, depending on the case, may include, but are not limited to:

(a) awareness campaigns;

(b) additional visual aids (signs, markings, and lighting);

(c) establishment of alternative routings;

(d) introducing changes to the design of parts of the aerodrome; and

(e) the mitigation of blind spots in the aerodrome control tower;

(f) training needs.

Aerodrome charts showing hot spots should be produced locally, checked regularly for accuracy, revised as needed, distributed locally, and published in the AIP.

ADR.OR.G.030 Aerodrome safety reporting system

(a) The aerodrome operator shall establish and implement a safety reporting system for all personnel and organisations operating or providing services at the aerodrome, in order to promote safety at, and the safe use of, the aerodrome.

(b) The aerodrome operator shall:

(1) require that the personnel and organisations mentioned in point (a) use the safety reporting system for the mandatory reporting of any accident, serious incident and occurrence; and

(2) ensure that the safety reporting system be used for the voluntary reporting of any defect, fault and safety hazard which could impact safety.

(c) The safety reporting system shall protect the identity of the reporter, encourage voluntary reporting and include the possibility that reports may be submitted anonymously.

(d) The aerodrome operator shall:

(1) record all reports submitted;

(2) analyse and assess the reports, as appropriate, in order to address safety deficiencies and identify trends;

(3) ensure that all organisations operating or providing services at the aerodrome which are relevant to the safety concern, participate in the analysis of such reports and that any corrective and/or preventive measures identified are implemented;

(4) conduct investigations of reports, as appropriate.

AMC1 ADR.OR.G.030(a) Safety reporting system

SAFETY REPORTING SYSTEM

(a) Safety reporting system — General

(1) An effective safety reporting system should include, aerodrome operator's personnel, aircraft operators, ground handling service providers, air navigation service providers, and any other organisation operating on the aerodrome, or providing services at the aerodrome;

(2) The safety reporting system should include voluntary reporting possibilities intended for safety hazards identified by the reporter, and that may have potential safety consequences;

(3) The aerodrome operator should identify which events are mandatory to be reported;

(4) The aerodrome operator should provide the means and the format for reporting which should be such that meets the existing reporting requirements as established by the GCAA, in terms of time, format, and required information to be reported;

(5) The safety reporting system should include, when requested by the reporter, an acknowledgement to for the submission of the report;

(6) The reporting process should be as simple as possible, and well documented, including details as to what, how, where, whom, and when to report;

(7) Regardless of the source or method of submission, once the information is received, it should be stored in a manner suitable for easy retrieval and analysis;

(8) Access to the submitted reports should be restricted to persons responsible for storing and analysing them;

(9) The safety reporting system should include a feedback system to the reporting person, when requested by the reporter , on the outcome of the occurrence analysis.

(b) Wildlife hazard reporting

(1) The aerodrome operator should ensure that its safety reporting system specifically addresses the requirement for all third parties (aircraft operators, aircraft mechanics, air traffic controllers, and other Air Traffic Services personnel, etc.) and all aerodrome personnel, to report to the aerodrome operator all wildlife strikes, and relevant identified hazards;

(2) The reporting of such third parties should be done irrespectively of any other requirements according to which they have to report to the aerodrome operator.

GM1 ADR.OR.G.030 Safety reporting system

NEED FOR SAFETY REPORTING

(a) The overall purpose of the safety reporting system is to use reported information to improve the level of safety performance of the aerodrome, and not to attribute blame.

(b) The objectives of the safety reporting system should be:

(1) to enable an assessment to be made of the safety implications of each relevant occurrence, serious incident and accident, including previous similar events, so that any necessary action can be initiated; and

(2) to ensure that knowledge of relevant occurrences, serious incidents and accidents is disseminated, so that other persons and organisations may learn from them.

ADR.OR.G.035 Record keeping

(a) The aerodrome operator shall establish an adequate system of record keeping, covering all its activities undertaken.

(b) The format of the records shall be specified in the aerodrome manual.

(c) Records shall be stored in a manner that ensures protection from damage, alteration and theft.

(d) Records shall be kept for a minimum of five years, except that the below records shall be kept as follows:

(1) the aerodrome compliance register , the alternative means of compliance in use for the lifespan of the certificate;

(2) arrangements with other organisations, atleast,for as long as such arrangements are in effect;

(3) manuals of aerodrome equipment or systems employed at the aerodrome, for as long as they are used at the aerodrome;

(4) safety assessment reports for the lifetime of the system/procedure/activity;

(5) personnel training, qualifications, and medical records as well as their proficiency checks, as appropriate;

(6) previous versions of risk and hazard register for a duration of not less than five years from the published date of the current version;

(7) driving authorisations and, where applicable, language proficiency certificates as appropriate;

(8) vehicle authorisations and aerodrome operator's vehicle maintenance records as appropriate.

GM1 ADR.OR.G.035 Record keeping

GENERAL- DOCUMENTATION TO BE RETAINED

(a) The system employed by the aerodrome operator for record keeping should provide for adequate procedures, storage facilities, and reliable traceability, retrievability and accessibility of the records related to the activities of the aerodrome operator, throughout the required retention period.

(b) The records should remain legible throughout the required retention period. The retention period starts when the record has been created or last amended.

(c) Computer systems should include safeguards against the ability of unauthorised personnel to alter the data.

(d) When hardware or software changes take place, special care should be taken that all necessary data continues to be accessible, at least, through the full retention period.

AMC1 ADR.OR.G.035 Record keeping

RECORDING OF AIRCRAFT MOVEMENTS

(a) The aerodrome operator should employ a system to be used for recording the aircraft movements at the aerodrome;

(b) Such a system should allow the aerodrome operator to record:

(1) the number of movements of each aircraft type using the aerodrome;

(2) the type of each aircraft movement (commercial air transportation, cargo, etc.);

(3) the date of each movement; and

(4) the number of passengers.

(c) The system used should also satisfy the provisions of GM1 ADR.OR.G.035.

SECTION H - OTHER APPROVALS (ADR.OR.H)

ADR.OR.H.060 Continuing compliance with the Certification Specifications (CS)

The aerodrome operator, following an amendment of the Certification Specifications, shall:

(a) perform a review to identify any Certification Specifications which are applicable to the aerodrome; and

(b) if relevant, initiate a change process in accordance with ADR.OR.H.065-Changes, before implementing the changes at the aerodrome.

ADR.OR.H.065 Changes

(a) Any change:

(1) affecting the scope of the Aerodrome Certificate/ Landing Area Acceptance, its compliance register and safety-critical aerodrome equipment; or

(2) significantly affecting elements of the aerodrome operator's management system as required in ADR.OR.G.005(b)- Management system;

shall require prior approval by the GCAA.

(b) For changes as mentioned in (a) requiring prior approval, the aerodrome operator shall notify, apply for and obtain an approval issued by the GCAA.

(c) The application for a change in accordance with point (b) shall be submitted before any such change takes place, in order to enable the GCAA to determine continued compliance with the requirements of this CAR and to amend, if necessary, the Aerodrome Certificate/Landing Area Acceptance and related scope and conditions attached to it.

The change shall only be implemented upon receipt of formal approval by the GCAA;

During the changes, the aerodrome operator shall operate under the conditions approved by the GCAA.

(d) The aerodrome operator shall provide the GCAA with the relevant documentation in accordance with point (e).

(e) As a part of its management system, as defined in ADR.OR.G.005- Management system, the aerodrome operator proposing a change to the aerodrome, its operation, its organisation or its management system shall:

(1) determine the interdependencies with any affected parties, plan and conduct a safety assessment in coordination with these organisations;

(2) align responsibilities, actions and mitigations with any affected parties, in a systematic way;

(3) ensure a comprehensive assessment of the change including any necessary interactions; and

(4) ensure that evidence and safety criteria are established and documented to support the safety assessment, and that the change supports the improvement of safety whenever reasonably practicable.

(f) Changes shall be properly coordinated within the organisation, with other service providers, users of the services, and other relevant undertakings.

(g) Aerodrome operator, while managing a change should comply with the requirements of CAR SMS.SA.005- Management of Change, as amended/updated.

(h) Upon introducing new aircraft types/ subtypes, irrespective of the size and the aerodrome reference code, the aerodrome operator shall conduct a compatibility study to ensure safe aircraft operations.

AMC1 ADR.OR.H.065 Changes

GENERAL – DOCUMENTS REQUIRED

The aerodrome operator should ensure that prior to initiating any change to the aerodrome or its operation, an application is submitted to the GCAA. The applicant should provide documentation containing a description of the proposed change, in which the following are identified:

(a) the scope of the certificate, and/or the elements of the compliance register, and/or the safety-critical aerodrome equipment and/or aerodrome operator's management system and the parts of aerodrome manual, which are affected by the change, including relevant appropriate detailed design drawings;

(b) the certification specifications with which the proposed change has been designed to comply with, including the certification specifications for which the applicant proposes to show compliance in a different manner in order to demonstrate an equivalent level of safety;

(c) the requirements of Part-ADR.OR and Part-ADR.OPS, and any other applicable requirements that have to be complied with as a result of the proposed change, including the way in which compliance is intended to be demonstrated; and

(d) the safety assessment as required for the proposed change.

AMC2 ADR.OR.H.065(a)(b) Changes

CHANGES REQUIRING PRIOR APPROVAL

(a) Use of alternative means of compliance as required by ADR.OR.A.015 (c)- Means of compliance.

(b) Changes to the compliance register , the conditions, scope of the certificate, as required by ADR.OR.H.065(a)(1) Changes.

(c) Changes to safety-critical aerodrome equipment as required by ADR.OR.H.065(a)(1) Changes.

(d) Changes significantly affecting elements of the aerodrome operator's management system as required by ADR.OR.H.065(a)(2) Changes.

(e) Changes to the level of protection of rescue and firefighting services as required by Part ACM.

(f) Changes to Post Holders and Accountable Manager as required by ADR.OR.A.025 and ADR.OR.A.30 – Personnel Requirement.

(g) Changes to low-visibility procedures as required by ADR.OPS.B.045.

(h) Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome as required by ADR.OPS.B.090.

(i) New aerodrome infrastructure or changes to the existing aerodrome infrastructure in the airside including but not limiting to visual aids/ navigational facilities, extensions/ reductions to pavement areas for use by aircraft; the erection of new buildings and alterations to existing buildings.

(j) Major maintenance, including refurbishment of the existing infrastructure.

(k) Reduction in aerodrome infrastructure and the compliance register, including long term closures of aerodrome infrastructure for upgrade, downgrade, investigation purpose.

(l) Airfield works that will result in the non-availability of critical aerodrome infrastructure or facility.

(m) Where specifically mentioned in this CAR.

(n) When requested by the GCAA.

AMC3 ADR.OR.H.065 Changes

GENERAL - CHANGE MANAGEMENT PROCEDURES

Notwithstanding the requirements of CAR SMS,

(a) The aerodrome operator's procedures, should cover the complete lifecycle of a change.

(b) The aerodrome operator should show that the procedures address all the actions and all the evidence needed in order to comply with the requirements, as appropriate. For this purpose, the aerodrome operator should use a compliance matrix, which

(1) identifies applicable regulations;

(2) provides the current status of compliance and the status of compliance following implementation of the change;

(3) details of measures taken to achieve compliance;

(4) the rationale explaining how the procedures demonstrate compliance with the regulation; and

(5) The rationale justifying any non-compliance identified along with the proposed mitigations to demonstrate equivalent level of safety.

(c) The aerodrome operator should include in the procedures:

(1) Accountabilities, roles and responsibilities for the change management processes identified in the procedures;

(2) Project timeline including (where applicable);

Including but not limiting to , start date, key milestones, OLS and other aeronautical surveys, friction testing, flight calibrations, photometric testing, lux levels, Pavement assessments, AIP publications, operational trials, internal verification and acceptance and the timescales for GCAA's review/ inspection and acceptance process;

(3) Interfaces with Safety Management Systems or other required systems; and

(4) Lines of communication or liaison with other involved parties.

GM1 ADR.OR.H.065 Changes

COMPLIANCE MATRIX

Following example of compliance matrix template may be used by the aerodrome operator to demonstrate compliance.

Design Element	CAR CS-DSN reference	Applicable Requirement	Compliance Statement (Should include current and future status of compliance)	Supporting Evidence	Post Implementation Compliance Verification	Supporting Evidence
Runway Side Stripe Marking	CAR CS-DSN.D.###	Except on a runway starter extension, a runway side stripe shall have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.	Current Status (Non-Compliant): Runway 04R and 22L is 40m wide with a side stripe marking width of 0.2m which is non-compliant. Future Status (Compliant): Runway 04R and 22L side stripe marking width will rectified to 0.9m, meeting the requirements of 12.7.3.1.	Drawing Ref: DRW-SS-OMXX-1234 Photo Ref: Side Stripe_R04/22	Side Stripe marking width is confirmed to be 0.9m. Method of measurement: Measuring Wheel. Physical Verification Date: 5th of Feb 2024. Verified By: (individual name and position).	Photo Ref: Side Stripe_PI_R04/22

GM2 ADR.OR.H.065 Changes

ASSESSMENT OF CHANGES

(a) Safety assessment for a change

A safety assessment for a change should include:

(1) identification of the scope of the change;

(2) identification of hazards;

(3) determination of the safety criteria applicable to the change;

(4) risk analysis in relation to the harmful effects or improvements in safety related to the change;

(5) risk evaluation and, if required, risk mitigation for the change to meet the applicable safety criteria;

(6) verification that the change conforms to the scope that was subject to safety assessment, and meets the safety criteria, before the change is put into operation; and

(b) Scope of the safety assessment

(1) The scope of the safety assessment should include the following elements and their interaction:

(i) the aerodrome, its operation, management, and human elements being changed;

(ii) interfaces and interactions between the elements being changed and the remainder of the system;

(iii) interfaces and interactions between the elements being changed and the environment in which it is intended to operate; and

(iv) the full lifecycle of the change from definition to operations.

(c) Safety criteria

The safety criteria used should be defined in accordance with the accepted procedures for the management of change contained in the aerodrome manual or SMS manual.

(d) The change management procedures should include means for identifying, assessing, and managing the complexity and impact of multiple changes on the organisation. The implementation of changes should be scheduled in a manner that considers any change in addition to other sequential or concurrent changes and the complexity that this may present to personnel or stakeholders, and maintains this within an acceptable level.

AMC1 ADR.OR.H.065(f) Changes

CHANGES AFFECTING STAKE HOLDERS

Having identified a change, the aerodrome operator should inform all stake holders potentially affected by the change.

GM1 ADR.OR.H.065(f) Changes

CHANGES AFFECTING STAKEHOLDERS

Potential stakeholders may include the following:

(a) air navigation service providers;

(b) airport rescue and firefighting services

(c) security

(d) aircraft operators;

(e) ground handlers and other associated service providers

(f) maintenance organisations;

(g) regulatory bodies; and

(h) other utility service providers (eg: power suppliers).

GM2 ADR.OR.H.065(f) Changes

CHANGES TO RUNWAY SAFETY

For changes which may have an effect on runway safety, the aerodrome operator should consult the local runway safety team.

GM1 ADR.OR.H.065(h) Changes

INTRODUCTION OF NEW AIRCRAFT TYPES

Aerodrome operator should

(a) assesses the aerodrome compatibility whenever introducing an aircraft type/model new to the aerodrome irrespective of the size of the aircraft;

(b) assessment should include all elements as per AMC1 ADR.OPS.B.090(b)

(c) include all concerned stakeholders in conducting the assessment;

(d) in case of envisaged overload operations due to the new aircraft type, necessary pavement assessment should be carried out as required in this CAR.

AMC2 ADR.OR.H.065 Changes

GENERAL - POST IMPLEMENTATION OF CHANGE

The aerodrome operator's change management procedure should include a post implementation review of the change to ensure that the aerodrome and its operations continue to meet the safety criteria after the change has taken place.

GM1 ADR.OR.H.065 Changes

GENERAL - POST IMPLEMENTATION OF CHANGE

Post implantation review should include, but not limiting to, the following:

(a) effectiveness of the change management process;

(b) learnings from the process;

(c) effectiveness of the proposed risk controls;

(d) compliance to the regulatory requirements;

(e) any incidents during the process;

(f) any amendment to process or controls or new training needs.

ADR.OR.H.070 Aerodrome Infrastructure projects

(a) The aerodrome operator shall:

(1) establish procedures to notify the GCAA and manage such projects as mentioned in (b) that are to be carried out within the aerodrome boundary;

(2) Unless otherwise notified by the GCAA, apply and obtain:

(i) design acceptance and acceptance to commence works from the GCAA prior to commencement of physical works;

(ii) technical acceptance verifying the completion of any aerodrome works;

(iii) relevant operational approval upon the completion of the project and prior to use in an operating environment.

(b) The aerodrome operator shall notify the GCAA on the below changes:

(1) any infrastructure change that may have an effect on the compliance register, scope of the certificate;

(2) any change to airside landside boundary;

(3) developments: major upgrade/refurbishment of existing infrastructure which could affect operations during work-in-progress and new infrastructure including but not limited to buildings, taxiways, aprons, visual aids or navigational aids.

(4) changes to existing infrastructure: changes to existing infrastructure that has an impact on the safety regularity and efficiency of aircraft operations.

(5) significant maintenance of infrastructure: that may involve downgrade or temporary closure, for a duration of time that may have an impact on the safety, regularity and efficiency of aircraft operations.

(6) reduction in aerodrome infrastructure: including long term closures of aerodrome infrastructure for upgrade, downgrade, investigation purpose.

(c) The aerodrome operator shall provide all project related details and information as requested by the GCAA.

(d) The Aerodrome Operator shall have a process to ensure that all projects are properly planned, managed, and coordinated.

(e) The project plan shall include sufficient time allocated for the necessary testing, readiness verification, and GCAA approval/acceptance.

AMC1 ADR.OR.H.070 Aerodrome Infrastructure projects

GENERAL- AERODROME CERTIFICATE –STANDARD CONDITION

(a) The Aerodrome Certificate states that changes in the physical characteristics of the aerodrome including the erection of new buildings and alterations to existing buildings or to visual aids/navigational facilities shall not be made without prior approval of the GCAA.

(b) The purpose of this condition is to ensure the GCAA is satisfied that changes to the aerodrome meet regulatory requirements and do not present safety or security hazards. Failure to notify the GCAA of changes may leave the aerodrome vulnerable to operational restrictions.

AMC1 ADR.OR.H.070(a)(b) Aerodrome Infrastructure projects

NOTIFICATION

(a) The aerodrome operator should use such means as established by the GCAA to notify of any infrastructure project including use of e-services available on the GCAA website;

(b) The aerodrome operator should notify the GCAA of any infrastructure projects that are deferred, withdrawn or superseded and use such means as established by the GCAA to request withdrawal of any irrelevant approvals/acceptances;

(c) The aerodrome operator should provide status update of infrastructure projects on a regular basis or when requested by the GCAA.

AMC2 ADR.OR.H.070(a)(b) Aerodrome Infrastructure projects

INFORMATION AS A PART OF PROJECT NOTIFICATION

The Aerodrome operator should provide the following as a part of their project notification:

(a) Project coordinator: details of the nominated Project Coordinator;

(b) Project brief: based on the project scope including but not limited to the initial concept of operations, general compliance details, and details regarding management of works;

(c) Accountable Manager endorsement: evidence the project has been notified to and endorsed by the Accountable Manager;

(d) Location Map: clearly indicating the location(s) of the proposed works, access routes and staging areas;

(e) Indicative project plan and timelines: available information and anticipated project timing;

(f) Impact assessment: including but not limited to impacts to the obstacle limitation surface, instrument flight procedures, navigational aids, rescue firefighting services, airside/landside boundaries whether temporary or permanent; and

(g) Other information: details as requested by the GCAA as part of the notification form or as directly requested from time to time.

GM1 ADR.OR.H.070(a)(b) Aerodrome Infrastructure projects

INFORMATION TO BE PROVIDED AS A PART OF PROJECT NOTIFICATION

(a) The aerodrome operator's process should ensure that all projects are properly planned, managed and coordinated according to documented and controlled procedures which include:

(1) elements required to define the project scope including:

(i) concept of operations if applicable;

(ii) impact assessment of the project on aerodrome operations and compliance to standards either temporary during works or permanently as a result of the project;

(iii) scope of physical works and identification of relevant standards;

(iv) known location(s) including works, access routes and staging areas;

(v) relationship and alignment to the aerodrome masterplan; and

(vi) indicative project plan and timelines including required approvals and acceptances;

(2) notification of the project scope to and endorsement by the accountable manager prior to commencement of the project including budgeting or investment approvals;

(3) nomination of a project coordinator, who will act as the focal point for coordination with the GCAA.

AMC3 ADR.OR.H.070(a) Aerodrome Infrastructure projects

STRUCTURED APPROACH- INFRASTRUCTURE PROJECTS

(a) The aerodrome operator should use such means as established by the GCAA to apply for infrastructure project acceptances including use of e-services available on the GCAA website.

(b) The aerodrome operator should establish procedures for the management of Infrastructure Projects.

(c) The GCAA may request for development meetings or project updates as well as carry out inspections of records or onsite at any stage of the infrastructure project.

(d) The GCAA's acceptance for changes to infrastructure will follow Table OR-4: Infrastructure Projects - Submissions and acceptances.

(e) Upon successful completion of works and obtaining the technical acceptance, the aerodrome operator should apply for an operational approval as stated in ADR.OR.H.075- Aerodrome operational approval, where applicable.

<table>
<tr><td colspan="2">Acceptances that are required before commencing work</td><td>Post Work Acceptance</td></tr>
<tr><td colspan="2">Can be applied as single application if all necessary documents are available</td><td rowspan="2">Technical Acceptance
(not an approval for operations)</td></tr>
<tr><td>Design Acceptance</td><td>Acceptance to Commence Works</td></tr>
<tr><td>• Compliance Matrix.
• Concept of Operations and associate Risk Assessment.
• Scale Drawings.
• Summary of identified other acceptances, approvals or no objections, noting evidence may be requested if required.</td><td>• Management of Change documentation.
• Risk Assessment for works in progress.
• Other supporting information as requested by the GCAA.
• Updated versions of documents provided as part of the project notification or Design Acceptance.</td><td>• Verification of compliance matrix (as built).
• Updated Management of Change documentation.
• Updated Concept of Operations and associated Risk Assessment documentation.
• As-built drawings and any other evidence confirming</td></tr>
</table>

• Other supporting information as requested by the GCAA. • Updated versions of documents provided as part of the project notification including the project brief, project plans, timelines; work locations and impacts.		project completion and compliance. • Post-Implementation Plan. • Other supporting information as requested by the GCAA. • Updated versions of documents provided as part of the Project notification, design acceptance or acceptance to commence works.

Table OR-4: Infrastructure Projects - Submissions and acceptances

ADR.OR.H.075 Aerodrome operational approval

(a) An aerodrome operator shall apply and obtain, through means established by the GCAA, an operational approval for:

(1) changes to the aerodrome infrastructure upon the completion of the project and prior to use in an operating environment, when deemed applicable by the GCAA;

(2) low visibility procedures as required ADR.OPS.B.045 Low visibility procedures;

(3) any other changes that have an impact on the safety, regularity and efficiency of aircraft and aerodrome operations;

(b) Aerodrome operator shall provide evidence of operational readiness, for the above changes which may include simulations, testing.

ADR.OR.H.080 Aerodrome special operational approval

An aerodrome operator shall apply and obtain through means established by the GCAA, a special operational approval when the aerodrome operator plans to introduce:

(a) one-time provision of service;

(b) operations trials and testing;

(c) emerging new technology.

GM1 .OR.H.080 Aerodrome special operational approval

(a) One-time provision of service can include the following:

(1) use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome;

(2) aerodrome infrastructure that is completed , however awaiting a technical acceptance;

(3) aerodrome infrastructure that is completed, however awaiting operational approval;

(4) air shows including static display of aircraft;

(b) Emerging new technology which include EVTOLs operations, autonomous vehicles operations, etc.

SECTION I – (Intentionally left blank)

SECTION J – OVERSIGHT (ADR.OR. J)

ADR.OR.J.017 Facilitations and cooperation

(a) An aerodrome operator shall:

(1) facilitate planned and unplanned /unannounced inspections and audits by the GCAA and shall cooperate as necessary for the efficient and effective exercise of the powers of the GCAA;

(2) provide access to any offices, facilities, documents, records, certificates, reports or any other evidence required by the GCAA for the purpose of audits, inspections, investigations, enforcement, certification, approval or any other reason as decided by the GCAA; and

(3) facilitate the possession of equipment provided to GCAA inspectors to support their oversight functions. This includes computers, cameras, recording devices, range finders, utilised by the GCAA to support regulatory oversight activities.

(b) An aerodrome operator shall not, directly or indirectly, restrict, impede or delay, the activities in (a).

(c) An aerodrome operator shall give the oversight process the necessary priority to function efficiently and effectively.

(d) Personnel authorised by the GCAA may take photographs of the aerodrome facilities and equipment for certification, audit and approval purposes. An Aerodrome Operator shall issue photography permits/authorisation to personnel authorised by the GCAA.

GM1 ADR.OR.J.017 Facilitations and cooperation

GENERAL-AUDIT REPORTS

(a) Audit reports are processed through systems established by the GCAA for this purpose.

(b) Aerodrome operator should nominate appropriate management team member to respond to the audits, this would normally be the relevant Post Holder.

GM1 ADR.OR.J.017(a)(1) Facilitations and cooperation

AUDIT PLANNING

(a) For planned audits, the GCAA will endeavour to provide at least two weeks' notice. Unplanned audits do not require notification.

(b) On receipt of audit notification, the aerodrome operator should clarify what access requirements are in place, to ensure the inspectors can provide the necessary documentation in time.

(c) Planned audits may be rescheduled by GCAA in coordination with the Aerodrome Operator.

(d) The Aerodrome Operator may request a planned audit to be rescheduled by the GCAA where unforeseen circumstances may limit the effectiveness of the audit process.

(e) The GCAA may conduct a full compliance audit at any time, but usually not more than three (3) years from the previous audit, based on risk profiling.

AMC1 ADR.OR.J.017(a)(2) Facilitations and cooperation

INSPECTOR ACCESS PASSES

(a) Aerodrome Operator should recognise that the inspectors of the GCAA will be in possession of a nation-wide security identification card issued by the UAE Ministry of interior in lieu of the airport specific pass. This card is identified as a “National Permit -UAE Airports” and affords the associated inspector access to all UAE civilian airports in accordance with the access rights defined in the card.

(b) Aerodrome Operators should arrange for the issue of all additional passes to inspectors authorised by the GCAA which may be necessary to enable access any part of the aerodrome, tenant company premises, equipment, records, documents and operator’s personnel.

(c) Aerodrome Operators should take all necessary measures to ensure that inspectors are not unduly delayed by security protocols. Access control points to the aerodromes should clearly display poster (or similar) that graphically identifies applicable passes for that checkpoint, including the ‘National Permit’ possessed by the inspectors of the GCAA (where applicable).

AMC2 ADR.OR.J.017(a)(2) Facilitations and cooperation

AUDITING WORK SPACE

(a) For a planned audit, the Aerodrome Operator should allocate an area for the inspectors to use, this area should:

(1) be sufficiently free from distraction and noise;

(2) be enclosed so as to allow confidential discussion; and

(3) contain a suitable workspace with table and chairs.

(b) For unplanned audits, the Aerodrome Operator should endeavour to provide (a).

AMC3 ADR.OR.J.017(a)(2) Facilitations and cooperation

ELECTRONIC EQUIPMENT

Aerodrome Operators should arrange for the provision of any approvals required to enable Inspectors of the GCAA to carry relevant electronic equipment into any part of the facilities, unit, tenant company premises, or otherwise as required to perform their duties.

AMC1 ADR.OR.J.017(c) Facilitations and cooperation

ATTENDANCE AT AUDITS

(a) All relevant Post Holders should be available for a planned audit.

(b) The opening and closing meetings should be attended by the Accountable Manager or their official delegate, supported by the relevant Post Holder.

ADR.OR.J.020 Findings and corrective actions

After receipt of a notification of findings, the Aerodrome Operator shall:

(a) ensure that all audit reports raised by the GCAA are signed by the Accountable Manager within the stipulated time;

(b) identify the root cause of the findings;

(c) provide a corrective action plan that meets the acceptance of the GCAA;

(d) demonstrate the corrective action implementation to the satisfaction of the GCAA within the period agreed.

GM1 ADR.OR.J.020 Findings and corrective actions

FINDINGS

(Intentionally left blank)

AMC1 ADR.OR.J.020(b)(c) Findings and corrective actions

CORRECTIVE ACTIONS PLAN

(a) The corrective action plan defined by the aerodrome operator should address the effects of the non-compliance, as well as its root cause.

(b) Corrective action plan does not result in appropriate action being taken within acceptable timelines, may lead to increased oversight by the GCAA.

GM1 ADR.OR.J.020(c)(d) Findings and corrective actions

PREVENTIVE AND CORRECTIVE ACTIONS

(a) Preventive action is the action to eliminate the cause of a potential non-compliance or other undesirable potential situation.

(b) Corrective action is the action to eliminate or mitigate the root cause(s), and prevent recurrence of an existing detected non-compliance, or other undesirable condition or situation.

(c) Proper determination of the root cause is crucial for defining effective corrective actions to prevent recurrence.

(d) Correction is the action to eliminate a detected non-compliance.

AMC2 ADR.OR.J.020(c) Findings and corrective actions

CORRECTIVE ACTION TARGET DATES

(Intentionally left blank)

ADR.OR.J.022 Non-compliance and enforcement actions

(a) An aerodrome operator shall ensure compliance with any operational restrictions, suspensions or revocations in case of non-resolutions of non-compliance.

(b) Aerodrome operators and their staff shall not engage in, support, or conceal unsafe acts.

(c) The GCAA may impose restrictions, suspend, limit or revoke an Aerodrome Certificate or a Landing Area Acceptance, if the holder cannot demonstrate its capability to maintain the appropriate safety standards.

GM1 ADR.OR.J.022 Non-compliance and enforcement actions

ON NOTICE PROGRAMME (ONP)- GENERAL

(Intentionally left blank)

GM2 ADR.OR.J.022 Non-compliance and enforcement actions

ON NOTICE PROGRAMME (ONP)- REQUIRED ACTION BY THE AERODROME OPERATOR

(a) Upon receiving ONP notification from GCAA, the aerodrome operator should submit a recovery plan.

(b) The GCAA will closely monitor the general performance of the organisation and its adherence to the recovery plan;

(1) The recovery plan should describe the "who, what, where, when and how". The recovery plan should provide deliverables that can be measured, including specific timescales. The submitted recovery plan will be subject to GCAA review and acceptance;

(2) Failure to submit/adhere to the recovery plan to GCAA, may result in enforcement action.

(c) If the organisation carries out satisfactorily the recovery plan, it may be lifted from the ONP.

GM3 ADR.OR.J.022 Non-compliance and enforcement actions

IMMEDIATE ACTION BY THE GCAA

In the event that a serious safety deficiency is detected by GCAA, the auditor will take immediate action without placing the organisation under ONP.

GM4 ADR.OR.J.022 Non-compliance and enforcement actions

CASES THAT COULD LEAD TO PLACING AN ORGANISATION UNDER ONP

(Intentionally left blank)

GM5 ADR.OR.J.022 Non- compliance and enforcement actions

ENFORCEMENT ACTION

Enforcement action may be taken in response to:

(a) a violation against federal laws;

(b) demonstration of gross negligence, incompetence, or evidence of wilful act, sabotage;

(c) failure to give the GCAA access to organisation's facilities or records;

(d) falsification of documentary evidence;

(e) malpractice or fraudulent use of the organisation or personal certificate / approval; or

(f) the lack of an Accountable Manager in an organisation.

ADR.OR.J.025 Immediate reaction to a safety problem

(a) The Aerodrome Operator shall establish and implement procedures intended to restrict aircraft operations where an unsafe condition exists on an aerodrome.

(b) A Level One (1) finding shall require immediate corrective or containment action by the organisation, the failure of which shall result in limitation, suspension, or revocation of the certificate, authorisation or license.

AMC1 ADR.OR.J.025 Immediate reaction to a safety problem

EVIDENCE OF IMPLEMENTATION

Aerodrome operator should review all regulatory materials promulgated by the GCAA and record the outcomes of the review, and document all tasks required to ensure effective implementation.

SUBPART- OPERATIONS REQUIREMENTS (ADR.OPS)

SECTION A – AERODROME DATA (ADR.OPS.A)

ADR.OPS.A.005 Aerodrome data

The aerodrome operator shall as appropriate:

(a) determine, document and maintain data relevant to the aerodrome and available services;

(b) provide the relevant air traffic services, where applicable and aeronautical information services providers the following:

(1) data relevant to the aerodrome and available services;

(2) the bearing strength of a pavement;

(3) electronic terrain and obstacle data;

(4) information on the status of certification of aerodromes and aerodrome conditions;

(5) the operational status of associated facilities, services and navigation aids within their area of responsibility; and

(6) any other information considered to be of operational significance.

(c) monitor the published data related to their scope.

(d) determination and reporting of aerodrome-related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth in this CAR while taking into account the established quality system procedures and in that respect, three types of positional data shall be identified: surveyed points (e.g. runway threshold), calculated points (mathematical calculations from the known surveyed points of points in space, fixes) and declared points (e.g. flight information region boundary points).

AMC1 ADR.OPS.A.005(a) Aerodrome data

AERODROME MAPPING DATA

(a) Aerodrome mapping data should be made available to the aeronautical information services for aerodromes deemed relevant by the GCAA where safety and/or performance-based operations suggest possible benefits.

(b) Where made available in accordance with (a), the selection of the aerodrome mapping data features to be collected should be made with consideration of the intended applications.

(c) Where made available in accordance with (a), aerodrome mapping data should comply with the accuracy and integrity requirements in ADR.OPS. A.010 Data quality requirements.

AMC1 ADR.OPS.A.005(b) Aerodrome data

AERODROME DATA

(a) Data relevant to the aerodrome and available services should include, but may not be limited to, items in the following list:

(1) aerodrome reference point;

(2) aerodrome and runway elevations;

(3) aerodrome reference temperature;

(4) aerodrome dimensions and related information;

(5) the bearing strength of the pavements;

(6) pre-flight altimeter check location;

(7) declared distances;

(8) intersection departure declared distances;

(9) condition of the movement area and related facilities;

(10) disabled aircraft removal capabilities;

(11) rescue and firefighting; and

(12) visual approach slope indicator systems.

(b) The aerodrome operator should measure and report to the aeronautical information services obstacles and terrain data in Area 3, and in Area 2 (the part within the aerodrome boundary) in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles should be reported to the aeronautical information services.

(c) Electronic obstacle data for all obstacles in Area 2 (the part within the aerodrome boundary) that are assessed as being a hazard to air navigation should be provided.

(d) Electronic terrain and obstacle data should be provided for:

(1) Area 2a, for those that penetrate the relevant obstacle data collection surface;

(2) penetrations of the take-off flight path area obstacle identification surfaces; and

(3) penetrations of the aerodrome obstacle limitation surfaces.

(e) Electronic terrain and obstacle data should be provided for Area 4 for terrain and obstacles that penetrate the relevant obstacle data collection surface, for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess the effect of terrain on decision height determination by use of radio altimeters.

(f) The aerodrome operator should establish arrangements with the Air Traffic Services providers and the appropriate authority for the provision of obstacles and terrain data outside of the aerodrome boundary.

(g) The geographical coordinates of obstacles in Area 2 (the part within the aerodrome boundary) and in Area 3 should be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the aeronautical information services authority.

GM1 ADR.OPS.A.005 (b) Aerodrome data

(a) PANS-AIM (DOC 10066), Appendix 8 provides requirements for obstacle data determination in Areas 2 and 3.

(b) Implementation of ICAO Annex 15, concerning the availability of obstacle data according to Area 2 and Area 3 specifications would be facilitated by appropriate advance planning for the collection and processing of such data.

AMC2 ADR.OPS.A.005(b) Aerodrome data

STRENGTH OF PAVEMENTS

(a) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg should be made available using the Aircraft Classification Rating-Pavement Classification Rating (ACR-PCR) method by reporting all of the following information:

(1) pavement classification rating (PCR) and numerical value;

(2) pavement type for ACR-PCR determination;

(3) subgrade strength category;

(4) maximum allowable tire pressure category or maximum allowable tire pressure value; and

(5) evaluation method.

(b) The PCR reported should indicate that aircraft with an aircraft classification rating (ACR) equal to or less than the reported PCR may operate on the pavement subject to any limitation on the tire pressure or aircraft all-up mass for specified aircraft type(s);

Note: Different PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

(c) The ACR of an aircraft should be determined in accordance with the standard procedures associated with the ACR-PCR method.

(d) For the purposes of determining the ACR, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

(e) Information on pavement type for ACR-PCR determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported using the following codes:

PAVEMENT TYPE FOR ACR-PCR DETERMINATION:	Code
Rigid pavement	R
Flexible pavement	F
If the actual construction is composite or non-standard, include a note to that effect (see example 2 below).	

SUBGRADE STRENGTH CATEGORY	Code
High strength: characterized by E = 200 MPa and representing all E values equal to or above 150 MPa, for rigid and flexible pavements.	A
Medium strength: characterized by E = 120 MPa and representing a range in E values equal to or above 100 MPa and strictly less than 150 MPa, for rigid and flexible pavements.	B
Low strength: characterized by E = 80 MPa and representing a range in E values equal to or above 60 MPa and strictly less than 100 MPa, for rigid and flexible pavements.	C
Ultra-low strength: characterized by E = 50 MPa and representing all E values strictly less than 60 MPa, for rigid and flexible pavements.	D
MAXIMUM ALLOWABLE TIRE PRESSURE CATEGORY:	Code
Unlimited: no pressure limit	W
High: pressure limited to 1.75 MPa	X
Medium: pressure limited to 1.25 MPa	Y
Low: pressure limited to 0.50 MPa	Z
EVALUATION METHOD	Code
Technical evaluation: representing a specific study of the pavement characteristics and the types of aircraft which the pavement is intended to serve.	T
Using aircraft experience: representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

Table OPS 5: ACR PCR reporting codes

Example 1.— If the bearing strength of a rigid pavement, resting on a medium-strength subgrade, has been assessed by technical evaluation to be PCR 760 and there is no tire pressure limitation, then the reported information would be:

PCR 760 / R / B / W / T

Example 2.—If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength subgrade, has been assessed by using aircraft experience to be PCR

550 and the maximum allowable tire pressure is 1.25 MPa, then the reported information would be:

PCR 550 / F / A / Y / U

(f) Criteria should be established to regulate the use of a pavement by an aircraft with an ACR higher than the PCR reported for that pavement in accordance with above paragraph (a) and (b).

(g) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg should be made available by reporting the following information:

maximum allowable aircraft mass; and

maximum allowable tire pressure.

Example: 4 000 kg/0.50 MPa

AMC3 ADR.OPS.A.005(b) Aerodrome data

AERODROME DIMENSIONS AND RELATED INFORMATION

The following data are measured or described, as appropriate, for each facility provided on the aerodrome:

(a) Runway:

(1) true bearing to one-hundredth of a degree;

(2) designation number;

(3) length;

(4) width;

(5) displaced threshold location to the nearest metre or foot;

(6) longitudinal slope, transverse slope;

(7) surface type;

(8) type of runway; and

(9) the existence of an obstacle free zone when provided.

(b) Strip/Runway End Safety Area/Stopway:

(1) Length, width to the nearest metre or foot;

(2) Surface type; and

(3) Arresting system – location (which runway end) and description.

(c) Taxiway:

(1) Designation;

(2) Width; and

(3) Surface type.

(d) Apron:

(1) Pavement bearing strength

(2) Surface type; and

(3) Aircraft stands.

(e) The boundaries of the air traffic control service.

(f) Clearway:

(1) length to the nearest metre or foot; and

(2) ground profile.

(g) Visual aids for approach procedures, marking and lighting of runways, taxiways and aprons, other visual guidance and control aids on taxiways and aprons, including runway holding positions, intermediate holding positions and Stopbars, and location and type of visual docking guidance systems.

(h) Location and radio frequency of any VOR aerodrome checkpoint.

(i) Location and designation of standard taxi-routes.

(j) Distances to the nearest metre or foot of localiser and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated runway extremities.

(k) The geographical coordinates of:

(1) each threshold;

(2) appropriate taxiway centre line points; and

(3) each aircraft stand;

are measured and reported to the aeronautical information services in degrees, minutes, seconds and hundredths of seconds.

AMC5 ADR.OPS.A.005(b) Aerodrome data

PRE-FLIGHT ALTIMETER CHECK LOCATION

(a) One or more pre-flight altimeter check locations should be established.

(b) The elevation of a pre-flight altimeter check location should be given as the average elevation, rounded to the nearest metre or foot, of the area on which it is located. The elevation of any portion of a pre-flight altimeter check location should be within 3 m (10 ft) of the average elevation for that location.

(c) Pre-flight check location should be located on an apron. Locating a pre-flight altimeter check location on an apron enables an altimeter check to be made prior to obtaining taxi clearance and eliminates the need for stopping for that purpose after leaving the apron. Normally an entire apron could serve as a satisfactory altimeter check location.

AMC6 ADR.OPS.A.005(b) Aerodrome data

DECLARED DISTANCES

(a) The following distances should be calculated to the nearest metre or foot for a runway and reported to the aeronautical information services and Air Traffic Services:

(1) Take-off run available (TORA);

(2) Take-off distance available (TODA);

(3) Accelerate stop distance available (ASDA); and

(4) Landing distance available (LDA).

(b) For each take-off intersection departure, the Runway Designator, Taxiway designator along with TORA, TODA and ASDA should be promulgated within AIP;

(c) Where intersection departures are provided, information signs advising the available TORA should be provided at each taxiway permitting a departure. The information signs must be in accordance with the requirement of this CAR.

GM1 ADR.OPS.A.005(b) Aerodrome data

DECLARED DISTANCES

(a) The distances are measured along the centre line of the runway and of any associated stopway and clearway. Declared distances may be reduced due to obstacles or operational requirements.

(b) The take-off run available (TORA), take-off distance available (TODA), accelerate stop distance available (ASDA) and landing distance available (LDA) should be calculated according to the following (all declared distances are illustrated for operations from left to right):

(1) Where a runway is not provided with a stopway or a clearway and the threshold is located at the extremity of the runway, the four declared distances should normally be equal to the length of the runway;

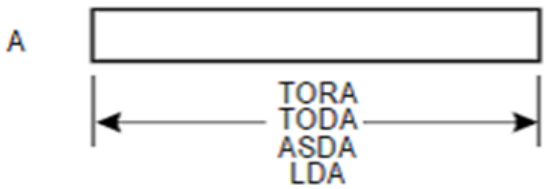


Figure OPS 1 : Declared distances

(2) When a runway is provided with a clearway (CWY), then the TODA will include the length of clearway;

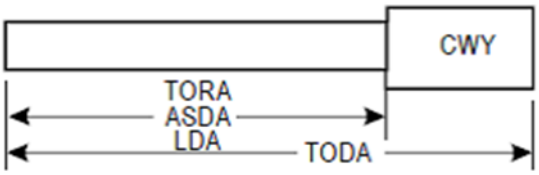


Figure OPS 2 : Declared distances with clearway

(3) Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway;

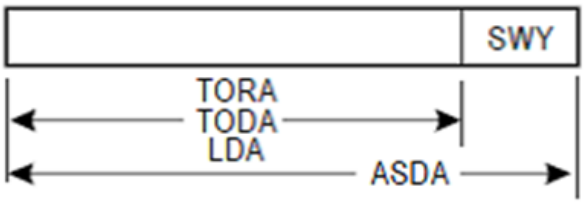


Figure OPS 3 : Declared distances with stopway

(4) Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced. A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected;

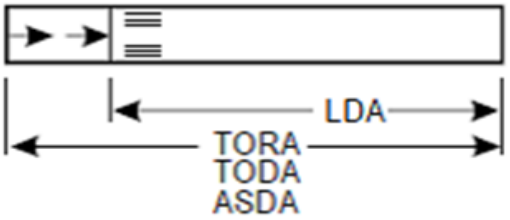


Figure OPS 4 : Declared distances with displaced threshold

(5) Where a runway is provided with more than one of the clearways, stopway, or having a displaced threshold, then more than one of the declared distances will be modified. The modification will follow the same principle as in (1)–(4)

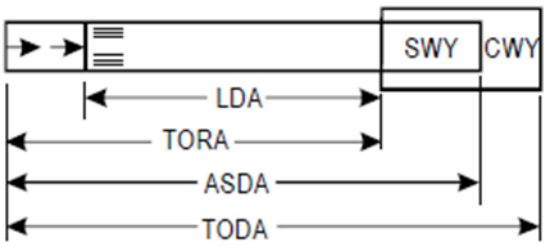


Figure OPS 5 : Declared distances with stopway clearway and displaced threshold

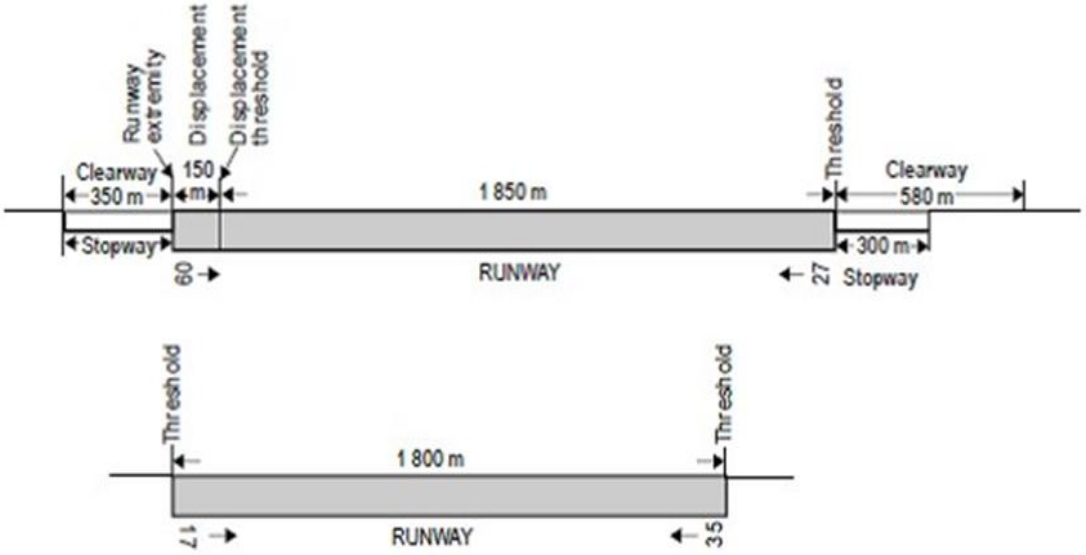


Figure OPS 6 : Declared distances illustration

(6) The information on declared distances should be provided according to the following table:

RUNWAY	TORA (m)	ASDA(m)	TODA(m)	LDA(m)
09	2 000	2 300	2 580	1 850
27	2 000	2 350	2 350	2 000
17	NU	NU	NU	1 800
35	1 800	1 800	1 800	NU

Table OPS 6: Declared distances - Information

If a runway direction cannot be used for take-off or landing, or both because it is operationally forbidden, then this should be declared and the words ‘not usable’ or the abbreviation ‘NU’ entered;

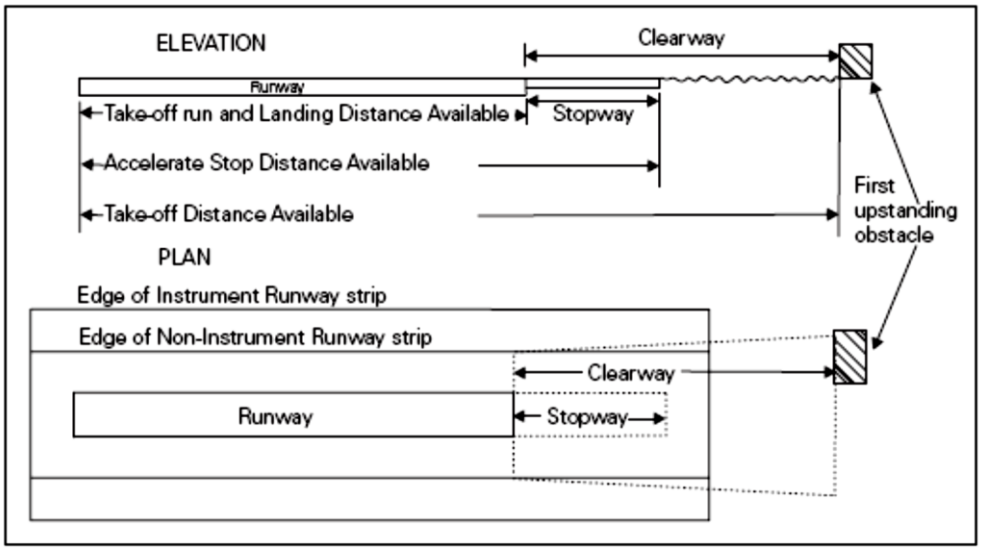


Figure OPS 7: Declared distances with first upstanding obstacle

(c) When intersection take-offs are performed, the datum line from which the reduced runway declared distances for take-off are determined, should be defined by the intersection of the downwind edge. Aerodrome operators should use this method to determine the origin of the Take-Off Run Available, in order to measure the distances for the intersection departure accurately;

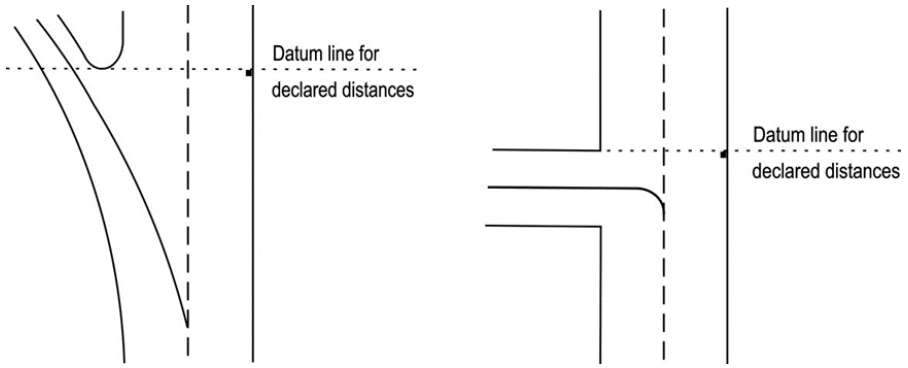


Figure OPS 8 : Datum for intersection take off - declared distance

AMC8 ADR.OPS.A.005(b) Aerodrome data

CONDITION OF THE MOVEMENT AREA AND RELATED FACILITIES

The condition of the movement area and the operational status of related facilities need to be monitored and reported, on matters of operational significance affecting aircraft and aerodrome operations, particularly in respect of the following:

(a) construction or maintenance work;

(b) rough or broken surfaces on a runway, taxiway or apron;

(c) other temporary hazards, including parked aircraft;

(d) failure or irregular operation of part or all the aerodrome visual aids; and

(e) failure of the normal or secondary power supply.

AMC9 ADR.OPS.A.005 Aerodrome data

DISABLED AIRCRAFT REMOVAL

(a) The contact details (telephone, email address, etc.) of the coordinator of operations for the removal of an aircraft disabled on or adjacent to the movement area should be made available on request to aircraft operators.

(b) Information concerning the capability to remove an aircraft disabled on or adjacent to the movement area should be made available to the users of the aerodrome.

(c) The capability to remove a disabled aircraft should be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove.

(d) The disabled aircraft removal plan should be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome, and include among other things:

(1) a list of equipment and personnel on, or in the vicinity of, the aerodrome which would be available for such purpose; and

(2) arrangements for the rapid receipt of aircraft recovery equipment kits available from other aerodromes.

AMC10 ADR.OPS.A.005 Aerodrome data

RESCUE AND FIREFIGHTING

(a) Information concerning the level of protection provided at an aerodrome for aircraft rescue and firefighting purposes during the hours of operation should be made available.

(b) The level of protection normally available at the aerodrome should be expressed in terms of the category of the rescue and firefighting services and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome.

(c) Changes in the level of protection normally available at the aerodrome for rescue and firefighting should be notified to the appropriate air traffic services units and aeronautical information services units to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units should be advised accordingly.

(d) A change in the level of protection should be expressed in terms of the new category of the rescue and firefighting services available at the aerodrome. Changes in the level of protection from that normally available at the aerodrome could result from a change in the availability of extinguishing agents, equipment to deliver the agents or personnel to operate the equipment, etc.

AMC11 ADR.OPS.A.005 Aerodrome data

VISUAL APPROACH SLOPE INDICATOR SYSTEMS

The following information concerning a visual approach indicator system should be made available:

(a) associated runway designation number;

(b) type of system; for a PAPI or APAPI installation, the side of the runway on which the lights are installed, i.e. left or right, is given;

(c) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right, is indicated;

(d) nominal approach slope angle(s) For a T-VASIS or an AT-VASIS this shall be angle Θ according to the formula in Figure CS-78:(a) and for a PAPI and an APAPI this shall be angle (B + C) ÷ 2 and (A + B) ÷ 2, respectively as in Figure CS-78: (b); and

(e) minimum eye height(s) over the threshold of the on-slope signal(s). For a T-VASIS or an AT-VASIS this shall be the lowest height at which only the wing bar(s) are visible; however, the additional heights

at which the wing bar(s) plus one, two or three fly-down light units come into view may also be reported if such information would be of benefit to aircraft using the approach. For a PAPI this shall be the setting angle of the third unit from the runway minus 2', i.e. angle B minus 2', and for an APAPI this shall be the setting angle of the unit farther from the runway minus 2', i.e. angle A minus 2'.

GM11 ADR.OPS.A.005 Aerodrome data

REPORTING PAVEMENT BEARING STRENGTH

(a) The ACR/PCR method of classifying the bearing strength of pavements considers the load imposed on the pavement by the aircraft. In this respect, the load rating of the aircraft is most significantly affected by the subgrade support strength of the pavement. ACRs are, therefore, numbers giving a relative load rating of the aircraft on pavements for certain specified subgrade strengths.

(b) The PCR is also a number which represents the load-bearing strength of the pavement in terms of the highest ACR which can be accepted on the pavement for unrestricted use.

(c) A PCR can also be identified and reported without a technical evaluation of the pavement by means of an assessment of the results of aircraft using the pavement. Providing the type and subgrade support strength of the pavement are known, the ACR of the most demanding aircraft successfully using the pavement can be reported as the PCR.

(d) A PCR is reported in a five-part format. Apart from the numerical value, notification is also required of the pavement type (rigid or flexible) and the subgrade support category. Additionally, provision is made for the Aerodrome Operator to limit the maximum allowable tire pressure. A final indication is whether the assessment has been made by a technical evaluation or from past experience of aircraft using the pavement.

(e) Guidance on reporting and publishing of PCRs is contained in the Aerodrome Design Manual (Doc 9157, Part 3). For convenience, dedicated software is available on the ICAO website for computing any aircraft ACR at any mass on rigid and flexible pavements for the four standard subgrade strength categories.

GM12 ADR.OPS.A.005 Aerodrome data

SURVEYING REQUIREMENTS FOR RUNWAY THRESHOLDS, TAXIWAYS AND AIRCRAFT STANDS

(a) Thresholds

(1) For surveying purposes, threshold positions must be taken as being at the geometric centre of the runway and at the beginning of the paved surface, i.e. the beginning of that portion of the runway usable for landing. Where thresholds are marked by appropriate threshold markings (e.g. displaced thresholds), these must be taken as the threshold points. Where threshold lighting is surveyed, the locations must be described on the diagram accompanying the report. Where there is no threshold lighting, an appropriate point for survey in accordance with the following figures must be selected.

(2) If the runway has only one threshold certified for landing, the runway end position must be surveyed. For surveying purposes, the runway end position (flight path alignment point) must be taken as being at the geometric centre of the runway and at the end of the paved surface, i.e. the end of that portion of the runway usable for landing.

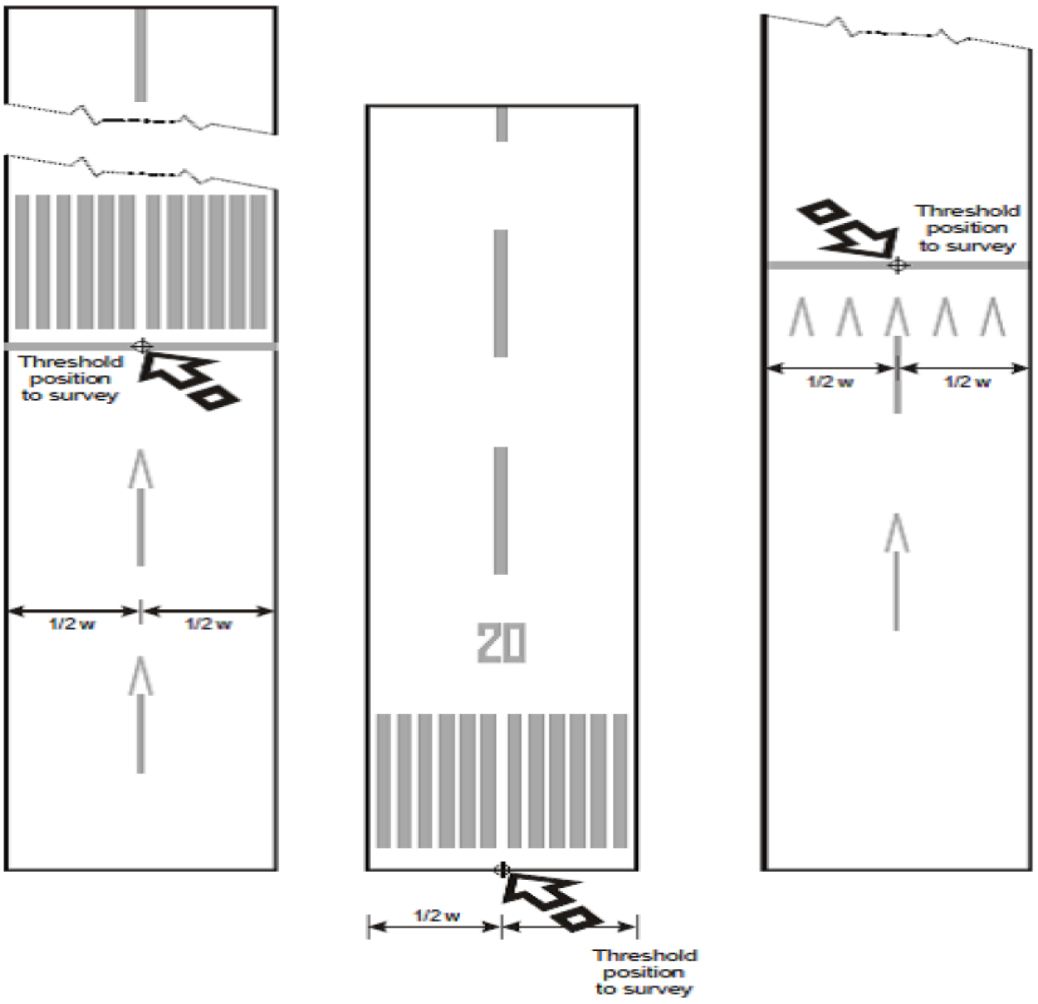


Figure OPS 9 : Threshold position to survey

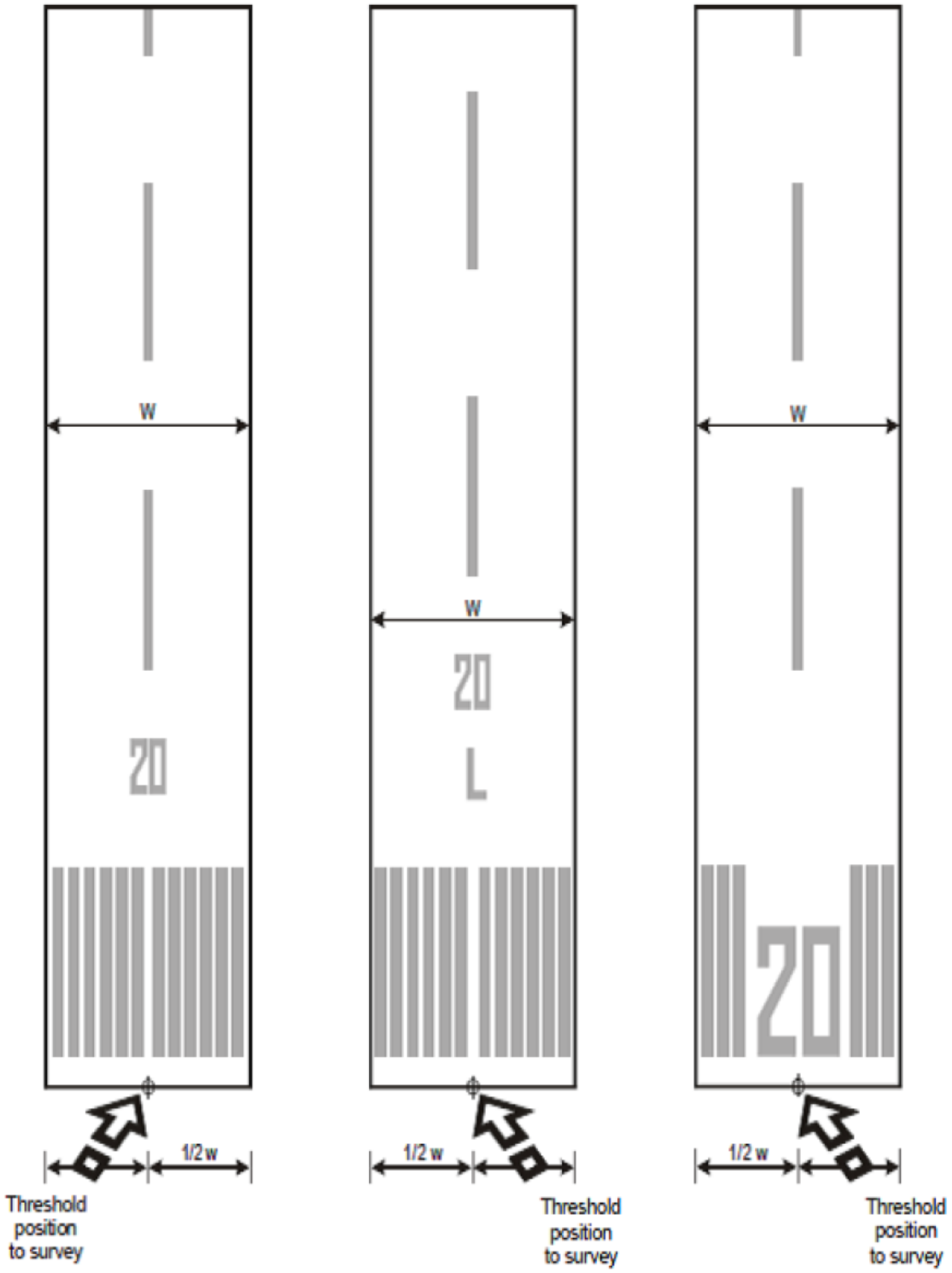


Figure OPS 10 : Threshold positions to survey

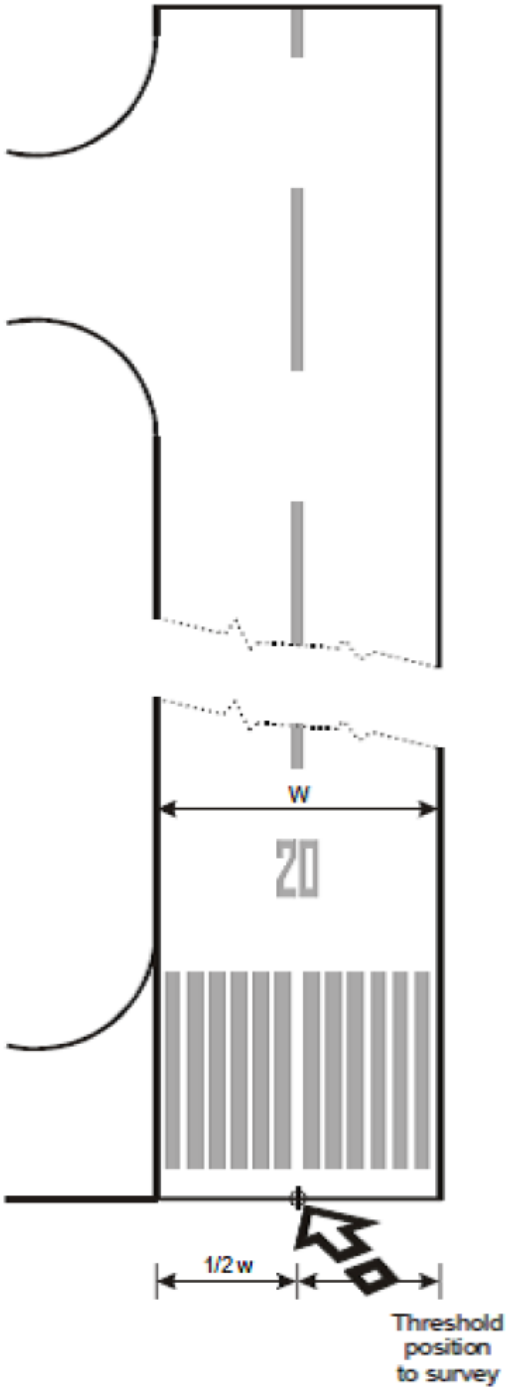


Figure OPS 11 : Threshold positions to survey

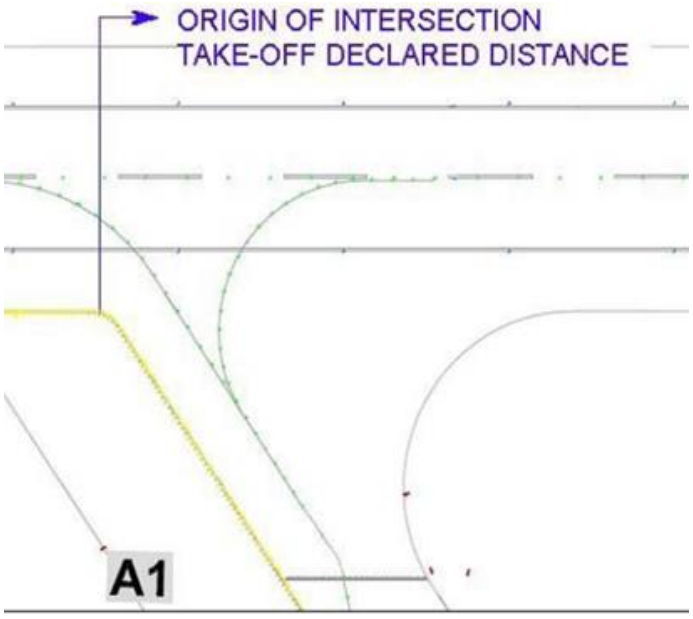


Figure OPS 12: Origin of intersection take- off declared distance

(b) Taxiways and stand/checkpoints — General

(1) Except as provided in (c) (1) below, for surveying purposes the centre (mid-width) of the taxiway centre line marking, apron taxilane marking or the aircraft stand guide line marking must be taken as the reference data.

(2) The points of commencement and ends of straight sections of taxiways, apron taxilanes and aircraft stand point guidance lines markings must be surveyed. Sufficient additional points must be surveyed to maintain the required accuracy along the lines.

(3) For curved sections of taxiways, apron taxilanes and aircraft stand guide line markings, the commencement and end of the curved section centre line must be surveyed together with the position of the centre point of the arc and its radius. In the case of a compound curve, the centre and radius of each arc and the commencement and end of each of the arcs must be surveyed. Where this is impracticable in the field, a series of sequential points must be surveyed along the curved section of the centre line with a maximum arc to chord distance not exceeding 0.25 m for taxiways and 0.10 m for apron taxilanes and aircraft stand guide line markings. Sufficient points must be surveyed to maintain the required accuracy along the

lines. The surveyor must, in processing the data, conduct a graphical inspection of the survey points to ensure collinearity.

(c) Taxiways

(1) To permit uninterrupted transition from the actual runway centre line to the taxiway centre line and to provide the required continuity of guidance for the aircraft navigation data base, differentiation must be made between the surface markings and the actual path the aircraft must follow. Therefore, for the guidance of aircraft entering or exiting the runway for take-off or landing, the following must be surveyed:

(i) the point at which the radius of turn, for each taxiway, is tangential to the runway centre line, and the point at which that radius of turn joins the taxiway centre line marking at a tangent;

(ii) the point that prescribes the centre of the arc; and

(iii) the radius of the arc.

Where this is impracticable in the field, a series of sequential points must be surveyed along the curved section of the centre line of taxiways.

(2) Where taxiway centre line marking is provided on a runway that is part of a standard taxi route, or a taxiway centre line is not coincident with runway centre line, the following points must be surveyed:

(i) the point on the taxiway marking at which the taxiway enters the runway;

(ii) the points at which the taxiway deviates from a straight line;

(iii) the intersection of the taxiway centre line marking and boundary of each ‘block’ that has been published as part of the aerodrome movement and guidance control system; and

(iv) the point on the taxiway marking at which the taxiway exits the runway.

(3) In defining taxiways, the following points must be surveyed at the centre of the centre line marking of each taxiway, as appropriate:

(i) intermediate holding positions and runway holding positions (including those associated with the intersection of a runway with another runway when the former runway is part of a standard taxi route) and for points established for the protection of sensitive areas for radio navigation aids;

(ii) taxiway intersection markings;

(iii) intersection of other taxiways, including taxiways described in point (c) (2) above;

(iv) intersections of 'blocks' defined for surface movement, guidance and control systems;

(v) commencement and end of selectable taxiway lighting systems provided as part of the surface movement, guidance and control systems, where different from subparagraph (iv) above;

(d) Aircraft stand points that are to be surveyed

(1) In defining the aircraft stands, the following points must be surveyed at the centre of the guide line marking of the aircraft stands, as appropriate:

(i) taxilane centre lines;

(ii) lead-in line(s);

(iii) turning line;

(iv) straight section of the turning line;

(v) nose wheel stopping position(s);

(vi) true heading of the alignment bar; and

(vii) lead-out line(s).

(2) Where aircraft stands are utilized by more than one aircraft type and different guide line markings exist, a diagram must be prepared by the surveyor showing the arrangement of the markings in use, together with an indication of the points surveyed. Where all the stands at an aerodrome are marked uniformly, only a single diagram needs to be prepared.

The points that should be surveyed for a taxiway or an aircraft stand, are shown in the following diagrams:

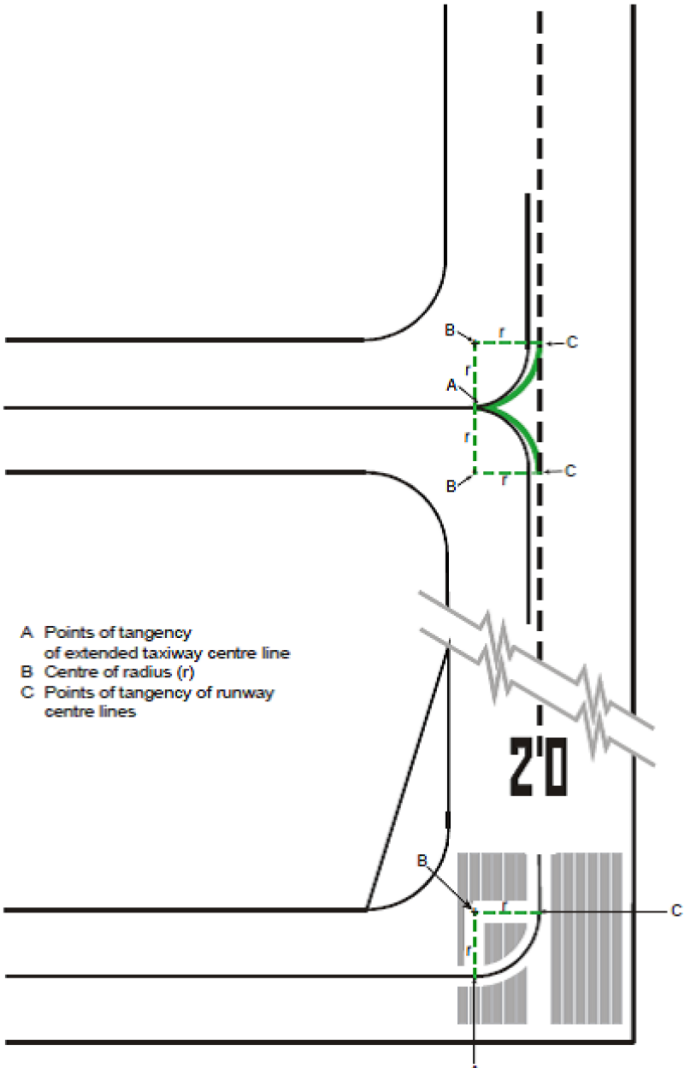


Figure OPS 13 : Point of tangancy, centre of radius and point of tangency of runway centerline

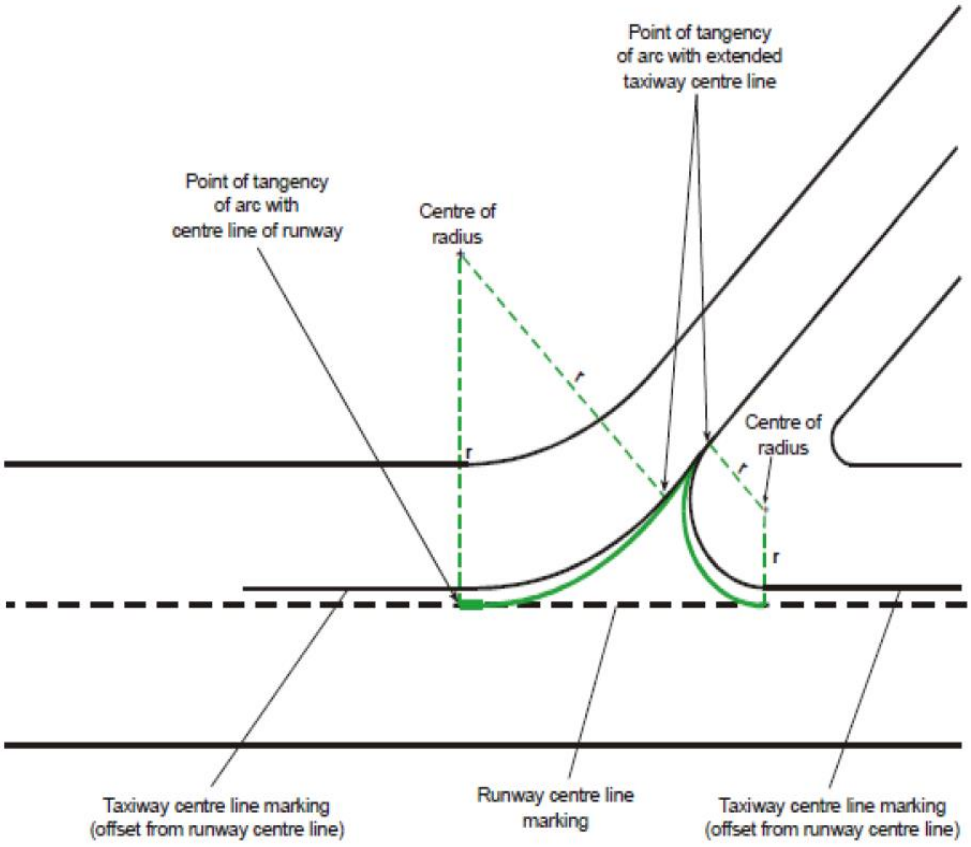


Figure OPS 14 : Point of tangancy, centre of radius and point of tangency of runway centerline

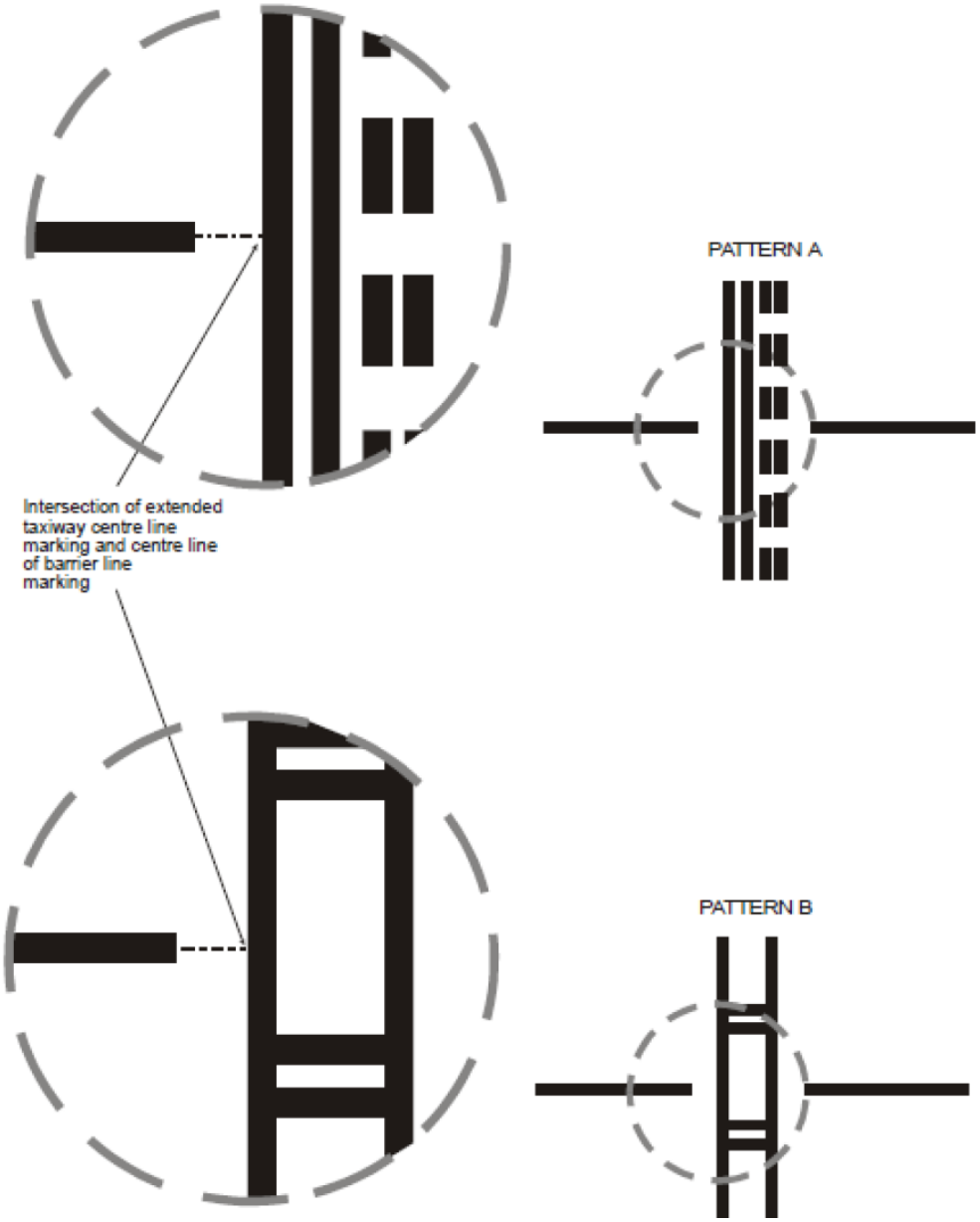


Figure OPS 15 : Runway holding position

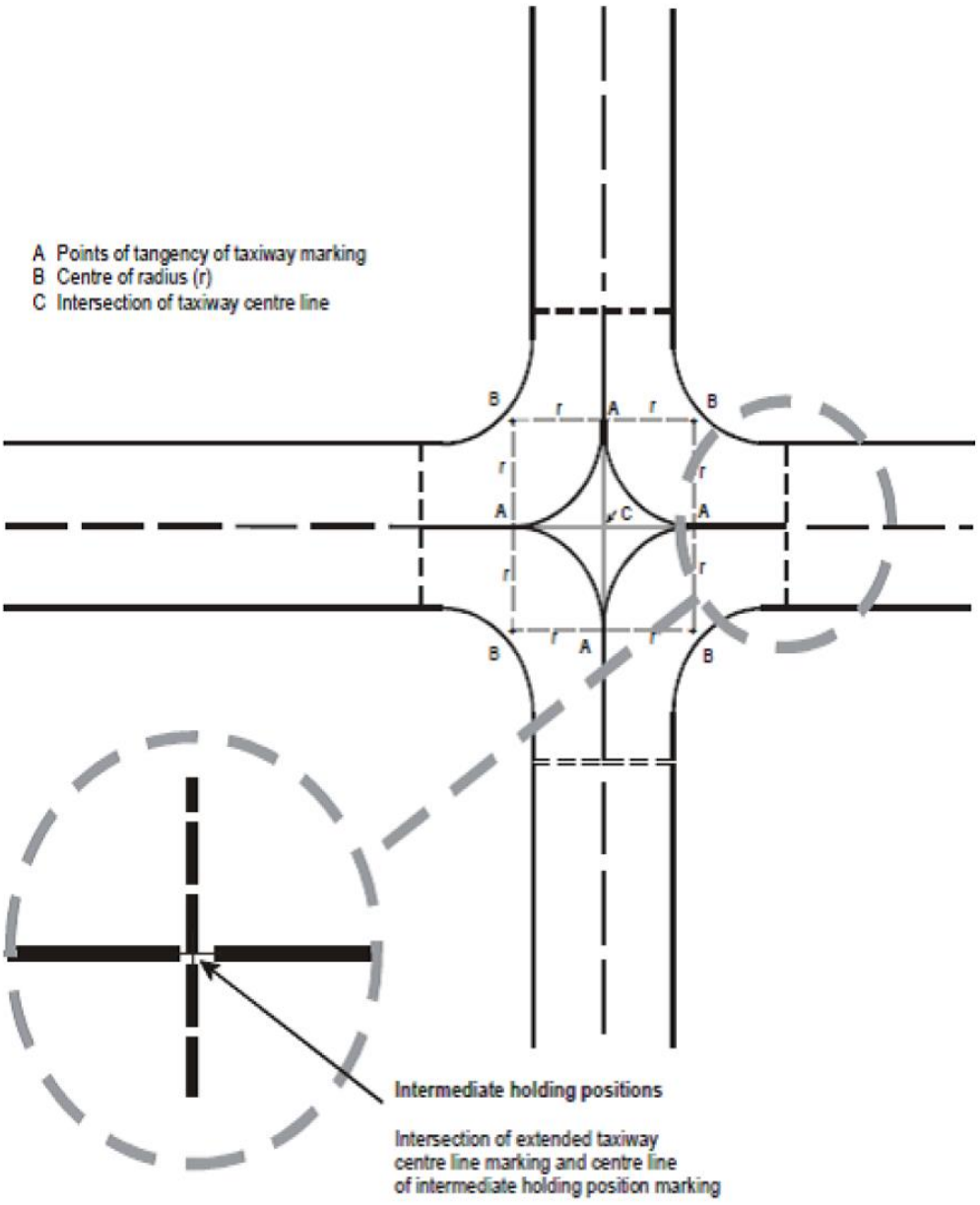


Figure OPS 16: Intermediate holding position

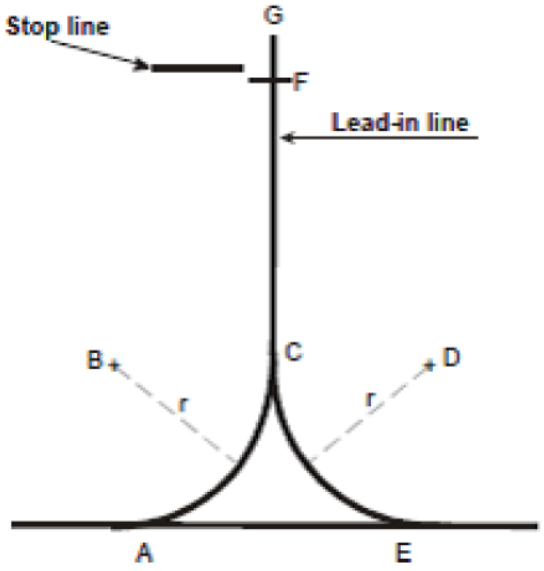


Figure OPS 17 : Simple nosewheel lead-in line

Position	Description of point to be surveyed
A	Point of tangency of centre of lead-in marking with centre of taxilane marking
B	Centre of arc of lead-in line and radius
C	Point of tangency with centre of lead-in line marking
D	Centre of arc of lead-in line and radius
E	Point of tangency of centre of lead-in marking with centre of taxilane marking
F	Nose wheel position of parked aircraft
G	End of lead-in line marking

Table OPS 7 : Description of points to be surveyed

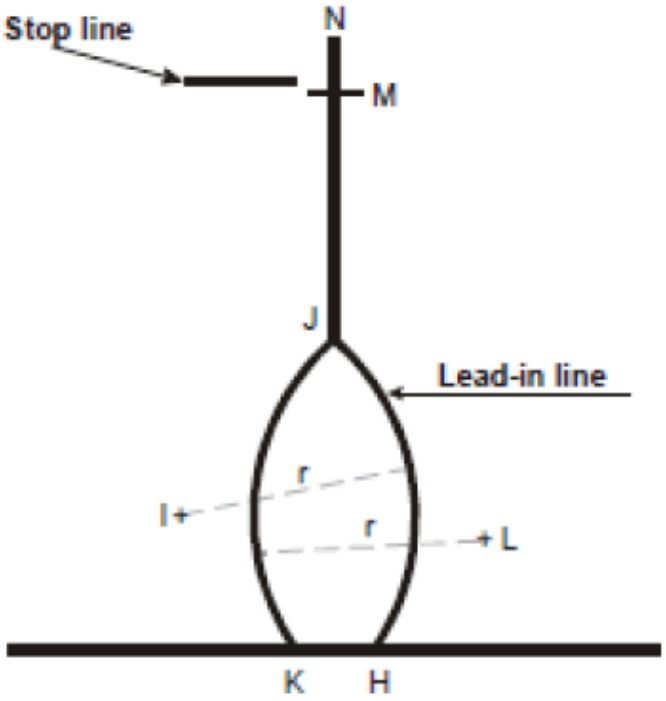


Figure OPS 18 : offset nosewheel lead-in line

Position	Description of point to be surveyed
H	Intersection of centre of lead-in line marking and centre of taxilane marking
I	Centre of arc of lead-in line and radius
J	Centre of commencement of straight section of lead-in line
K	Intersection of centre of lead-in line marking and centre of taxilane marking
L	Centre of arc of lead-in line and radius
M	Nosewheel position of parked aircraft
N	End of lead-in line marking

Table OPS 8: Description of points to be surveyed

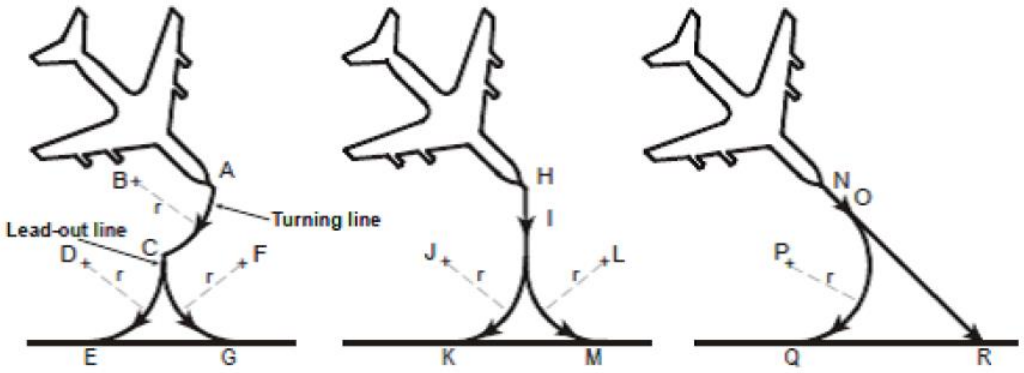


Figure OPS 19 : Simple nosewheel lead-out line

Position	Description of point to be surveyed
A	Centre of commencement of turning line marking
B	Centre of arc of turning line and radius
C	Centre of intersection of turning line marking and lead-out line marking
D	Centre of arc of lead-out line and radius
E	Point of tangency of centre of lead-out line marking and taxilane marking
F	Centre of arc of lead-out line and radius
G	Point of tangency of centre of lead-out line marking and taxilane marking
H	Commencement of lead-out line
I	Centre of commencement of curved section of lead-out line
J	Centre of arc of lead-out line and radius
K	Point of tangency of centre of lead-out line marking and taxilane marking
L	Centre of arc of lead-out line and radius
M	Point of tangency of centre of lead-out line marking and taxilane marking
N	Point of tangency of centre of lead-out line marking and taxilane marking
O	Centre of commencement of curved section of lead-out line
P	Centre of arc of lead-out line and radius
Q	Point of tangency of centre of lead-out line marking and taxilane marking

R	Intersection of centre of lead-out line marking and taxilane marking

Table OPS 9 : Description of points to be surveyed

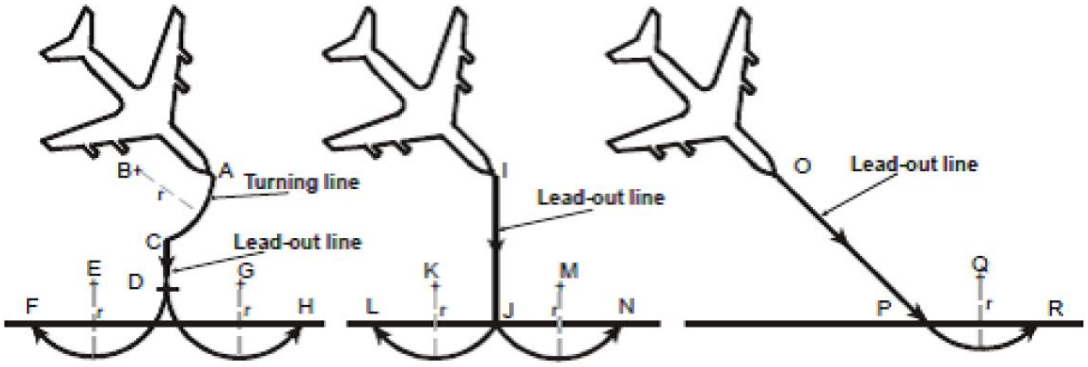


Figure OPS 20: Offset nose when lead-out lines

Position	Description of point to be surveyed
A	Centre of commencement of turning line marking
B	Centre of arc of turning line and radius
C	Centre of intersection of turning line marking and lead-out line marking
D	Centre of end of straight section of lead-out line marking
E	Centre of arc of lead-out line and radius
F	Intersection of centre of lead-out line marking and taxilane marking
G	Centre of arc of lead-out line and radius
H	Intersection of centre of lead-out line marking and taxilane marking
I	Commencement of lead-out line
J	Centre of commencement of curved section of lead-out line
K	Centre of arc of lead-out line and radius
L	Intersection of centre of lead-out line marking and taxilane marking
M	Centre of arc of lead-out line and radius
N	Intersection of centre of lead-out line marking and taxilane marking
O	Commencement of lead-out line
P	Centre of commencement of curved section of lead-out line
Q	Centre of arc of lead-out line and radius

R	Intersection of centre of lead-out line marking and taxilane marking

Table OPS 10 : Description of points to be surveyed

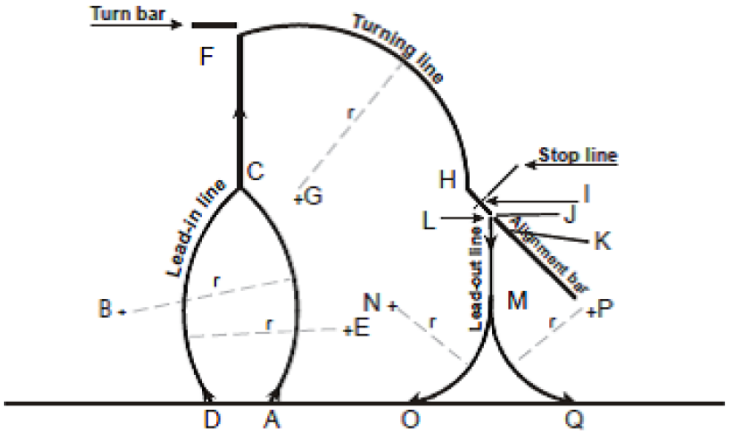


Figure OPS 21 : Turning line

Position	Description of point to be surveyed
A	Intersection of centre of lead-in line marking and centre of taxilane marking
B	Centre of arc of lead-in line and radius
C	Centre of commencement of straight section of lead-in line
D	Intersection of centre of lead-in line marking and centre of taxilane marking
E	Centre of arc of lead-in line and radius
F	End of straight section of lead-in line marking/commencement of turning line marking
G	Centre of arc of turning line and radius
H	Centre of commencement of straight section of turning line marking
I	Nose wheel position of parked aircraft
J	Centre of end of straight section or turning line marking
K	True bearing of alignment bar
L	Commencement of lead-out line
M	Centre of commencement of curved section of lead-out line

N	Centre of arc of lead-out line and radius
O	Point of tangency of centre of lead-out line marking and taxilane marking
P	Centre of arc of lead-out line and radius
Q	Point of tangency of centre of lead-out line marking and taxilane marking

Table OPS 11 : Description of points to be surveyed

GM13 ADR.OPS.A.005 Aerodrome data

COVERAGE AREAS FOR TERRAIN AND OBSTACLE DATA PROVISION

(a) The coverage areas for sets of electronic terrain and obstacle data should be specified as follows:

(1) Area 1: the entire territory of the State;

(2) Area 2: within the aerodrome surroundings, sub-divided as follows:

(i) Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists;

(ii) Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15 per cent to each side;

(iii) Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a; and

(iv) Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest.

(3) Area 3: the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway centre line, and 50 m from the edge of all other parts of the aerodrome movement area;

(4) The area extending 900 m prior to the runway threshold, and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.

(b) A graphical representation of the terrain data collection surfaces for Areas 1 and 2 is shown in the following figure:

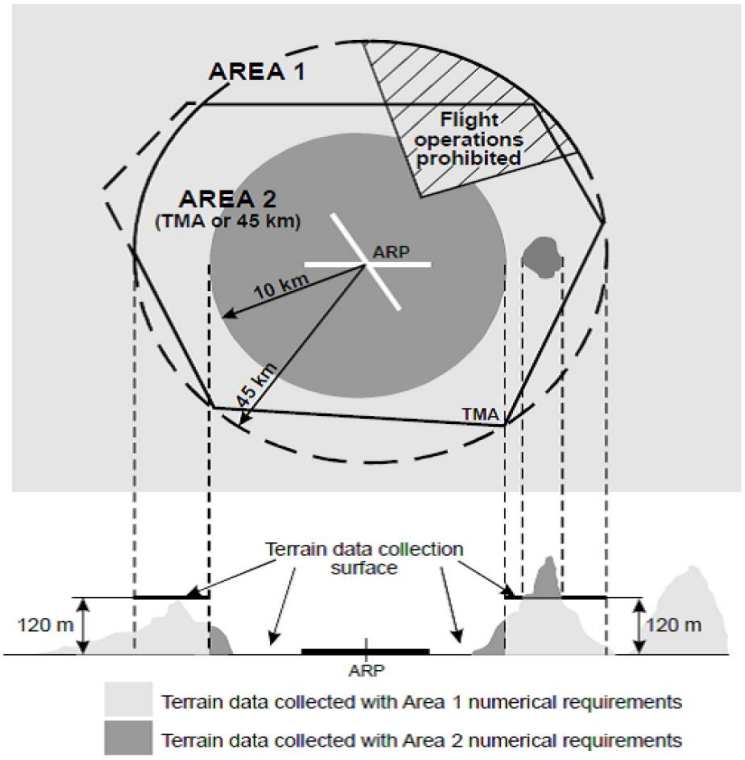


Figure OPS 22 : Terrain data collection surface - Area 1 and Area 2

(1) Within the area covered by a 10-km radius from the ARP, terrain data should comply with the Area 2 numerical requirements;

(2) In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that penetrates the horizontal plane 120 m above the lowest runway elevation, should comply with the Area 2 numerical requirements;

(3) In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that does not penetrate the horizontal plane 120 m above the lowest runway elevation, should comply with the Area 1 numerical requirements;

(4) In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, terrain data should comply with the Area 1 numerical requirements.

(c) A graphical representation of the obstacle data collection surfaces for Areas 1 and 2 is shown in the following figure:

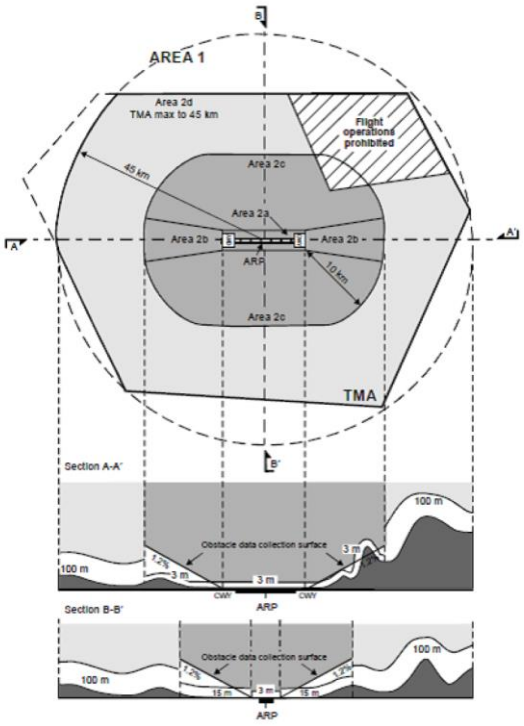


Figure OPS-23: Obstacle data collection surfaces- Area 1 and Area 2

(1) Obstacle data should be collected and recorded in accordance with the Area 2 numerical requirements;

(i) The Area 2a obstacle collection surface should have a height of 3 m above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

(ii) The Area 2b obstacle collection surface has an 1.2 % slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15 % to each side;

(iii) The Area 2c collection surface has an 1.2 % slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c should be the elevation of the point of Area 2a at which it commences; and

(iv) The Area 2d obstacle collection surface has a height of 100 m above ground.

(2) In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, obstacle data should be collected and recorded in accordance with the Area 1 requirements;

(3) Data on every obstacle within Area 1 whose height above the ground is 100 m or higher should be collected and recorded in the database in accordance with the Area 1 numerical requirements specified in Table 12.

(d) A graphical representation of the terrain and obstacle data collection surfaces for Area 3 is shown in the following figure:

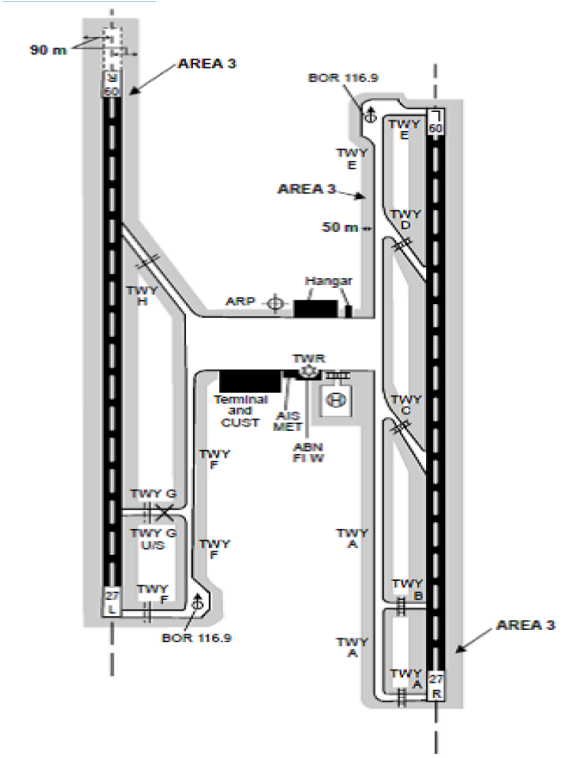


Figure OPS 24 : Terrain and data collection surface - Area 3

(1) The data collection surface for terrain and obstacles extends a half meter (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area;

(2) Terrain and obstacle data in Area 3 should comply with the numerical requirements specified in Tables 12 and 13, respectively;

(e) A graphical representation of the obstacle data collection surfaces for Areas 4 is shown in the following figure:

(1) Terrain data in Area 4 should comply with the numerical requirements specified in Table 12;

(2) The horizontal extent of Area 2 covers Area 4. More detailed obstacle data may be collected in Area 4 in accordance with Area 4 numerical requirements for obstacle data specified in Table 13.

(3) Where the terrain at a distance greater than 900 m (3000 ft) from the runway threshold is mountainous or otherwise significant, the length of Area 4 should be extended to a distance not exceeding 2000 m (6500 ft) from the runway threshold.

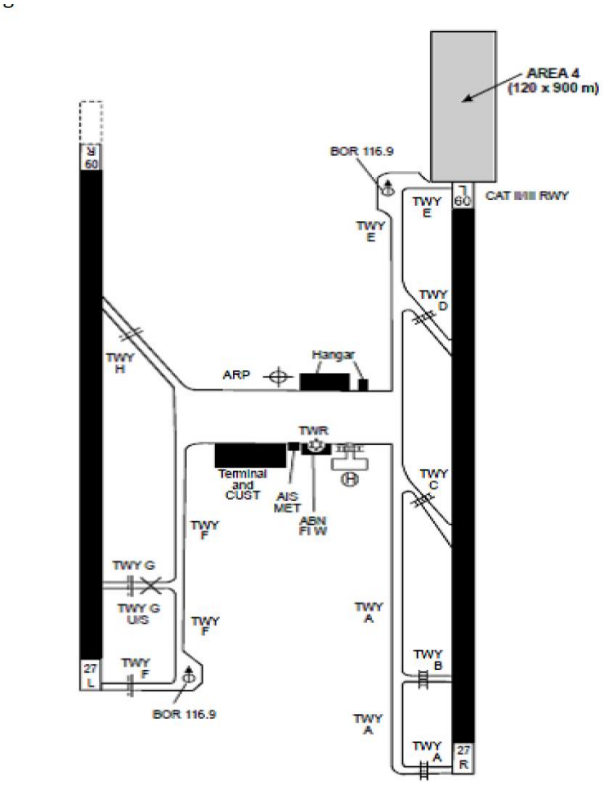


Figure OPS 25: Terrain and obstacle data collection surface - Area 4

	Area 1	Area 2	Area 3	Area 4
Post spacing	3 arc seconds (approx. 90 m)	1 arc seconds (approx. 30 m)	0.6 arc seconds (approx. 20 m)	0.3 arc seconds (approx. 9 m)

Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level	90 %	90 %	90 %	90 %
Data classification	Routine	Essential	Essential	Essential
Maintenance period	as required	as required	as required	as required

Table OPS 12 : Terrain data numerical requirements

	Area 1	Area 2	Area 3	Area 4
Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level	90 %	90 %	90 %	90 %
Data classification Integrity level	Routine	Essential	Essential	Essential
Maintenance period	as required	as required	as required	as required

Table OPS 13 : Obstacle data numerical requirements

ADR.OPS.A.006 Aerodrome reference point

(a) An aerodrome reference point shall be established for an aerodrome.

(b) The aerodrome reference point shall be located near the initial or planned geometric centre of the aerodrome and normally should remain where first established.

(c) The aerodrome reference point shall be measured and reported to the aeronautical information services in degrees, minutes, and seconds.

ADR.OPS.A.007 Aerodrome reference temperature

An aerodrome reference temperature shall be determined for an aerodrome in degrees Celsius.

AMC1 ADR.OPS.A.007 Aerodrome reference temperature

The aerodrome reference temperature should be the monthly mean of the daily maximum temperatures for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature). This temperature should be averaged over a period of years.

GM3 ADR.OPS.A.007 Aerodrome reference temperature

AERODROME REFERENCE TEMPERATURE

(a) This temperature should be calculated and averaged over a period of at least 5 years and is determined in degrees Celsius. However, from the perspective of climatological relevance, a minimum time period of 10 years is recommended, where available.

(b) The aerodrome reference temperature should always be published and used with the corresponding reference to the time period used for the calculation (e.g. Aerodrome reference temperature 27,1°C [2001-2010]). The aerodrome reference temperature should be recalculated, if the data used is over 30 years outdated.

ADR.OPS.A.009 Aerodrome and runway elevations

The following shall be measured and reported to the aeronautical information services:

(a) The aerodrome elevation and geoid undulation at the aerodrome elevation position to the accuracy of one-half metre or foot;

(b) For non-precision approaches, the elevation and geoid undulation of each threshold, the elevation of the runway end and any significant high and low intermediate points along the runway, to the accuracy of one-half metre or foot;

(c) For precision approach runway, the elevation and geoid undulation of the threshold, the elevation of the runway end and the highest elevation of the touchdown zone, to the accuracy of one-quarter metre or foot.

ADR.OPS.A.010 Data quality requirements

The aerodrome operator shall have formal arrangements with the organisations with which it exchanges aeronautical data or aeronautical information and shall ensure the following:

(a) all data relevant to the aerodrome and available services is provided with the required quality; data quality requirements (DQRs) are complied with at data origination and maintained during data transmission;

(b) the accuracy of aeronautical data is as specified in the aeronautical data catalogue;

Note: The Aeronautical Data Catalogue is a general description of the aeronautical Information management (AIM) data scope and consolidates all data that can be collected and maintained by the aeronautical information service (AIS). It provides a reference for aeronautical data origination and publication requirements.

(c) the integrity of aeronautical data is maintained throughout the data process from survey/ origination to transmission, to next intended user, based on the integrity classification specified in the aeronautical data catalogue. In addition, procedures shall be put in place so that:

(1) for routine data, corruption is avoided throughout the processing of the data;

(2) for essential data, corruption does not occur at any stage of the entire process and additional processes are included, as needed, to address potential risks in the overall system architecture to ensure data integrity at that level;

(3) for critical data, corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks;

(d) the resolution of the aeronautical data is commensurate with the actual data accuracy;

(e) the traceability of the aeronautical data;

(f) the timeliness of the aeronautical data, including any limits on the effective period;

(g) the completeness of the aeronautical data;

(h) the format of the delivered data meets the specified requirements.

(i) ensure that data validation and verification techniques are employed to ensure that the aeronautical data meets the associated data quality requirements.

(j) Data integrity should be assured by employing cryptographic technologies.

Note: The means to implement systematic cycling codes include the use of hash functions and cyclic redundancy check (CRC).

AMC1 ADR.OPS.A.010 Data quality requirements

GENERAL REQUIREMENTS

The aerodrome operator should implement the procedures to:

(a) monitor and review data relevant to the aerodrome and available services originating from the aerodrome operator, and promulgated by the relevant air traffic services providers;

(b) notify the relevant aeronautical information services, and air traffic services providers of any inaccuracies, changes necessary to ensure correct and complete data relevant to the aerodrome, and available services.

AMC2 ADR.OPS.A.010 Data quality requirements

FORMAL ARRANGEMENTS

(a) Organisations concerned

The aerodrome operator should have formal arrangements with public or private entities providing:

(1) air navigation services;

(2) services for the origination and provision of survey data;

(3) electronic terrain data; and

(4) electronic obstacle data,

with which it exchanges aeronautical data and/or aeronautical information.

(b) Content of formal arrangements

Such formal arrangements should include the following minimum content:

(1) aeronautical data to be provided;

(2) the quality requirements for each data item supplied according to the aeronautical data catalogue;

(3) the method(s) for demonstrating that the data provided conforms with the specified requirements;

(4) the action to be taken in the event of discovery of a data error, or inconsistency in any data provided;

(5) the following minimum criteria for notification of data changes:

(i) criteria for determining the timeliness of data provision based on the operational or safety significance of the change;

(ii) any prior notice of expected changes; and

(6) the means to be adopted for notification;

(7) the party responsible for documenting data changes;

(8) data exchange details such as format or format change process;

(9) any limitations on the use of data;

(10) requirements for the production of data origination quality reports;

(11) metadata to be provided; and

(12) contingency requirements concerning the continuity of data provision.

GM1 ADR.OPS.A.010 Data quality requirements

URGENT DISTRIBUTION OF AERONAUTICAL INFORMATION

The obligation to comply with the relevant provisions of ADR.OPS. A.010 -Data quality requirements, does not prevent the urgent distribution of aeronautical information necessary to ensure the safety of flight.

It is recognised that, in this case, it is not always possible to comply with all the relevant provisions. However, it is also not possible to determine a priority in all cases where this exception may apply; hence this is dependent on a case-by-case individual assessment made by competent staff.

GM1 ADR.OPS.A.010(c)(d) Data quality requirements

DATA ACCURACY AND INTEGRITY- LATITUDE AND LONGITUDE

Elevation/Altitude/Height	Accuracy Data Type	Integrity Classification
Aerodrome/Heliport reference point	30m surveyed/calculated	routine
Navaids located at the aerodrome/heliport	3m surveyed	essential
Obstacles in Area 3	0.5m surveyed	essential
Obstacles in Area 2 (the part within the aerodrome/heliport boundary)	5m surveyed	essential
Geometric centre of TLOF or FATO thresholds (H)	1m surveyed	critical
Runway thresholds (A)	1m surveyed	critical
Runway end (flight path alignment point) (A)	1m surveyed	critical
Runway centre line points (A)	1m surveyed	critical
Runway-holding position (A)	0.5m surveyed	critical
Taxiway centre line/parking guidance line points (A)	0.5m surveyed	essential
Helicopter ground taxiway centre line points and helicopter air taxiway points (H)	0.5m surveyed/calculated	essential
Intermediate holding position marking line (A)	0.5m surveyed	essential
Helicopter ground taxiway intersection marking line H)	0.5m surveyed	essential
Exit guidance line	0.5m surveyed	essential
Apron boundaries (polygon)	1m surveyed	routine
Aircraft /Helicopter stand points/INS checkpoints	0.5m surveyed	routine

Table OPS 14 :Data accuracy and integrity- latitude and longitude

GM2 ADR.OPS. A.010(c) (d) Data quality requirements

DATA ACCURACY AND INTEGRITY - ELEVATION/ALTITUDE/HEIGHT

Elevation/Altitude/Height	Accuracy Data Type	Integrity Classification
Heliport crossing height, PinS approaches (H)	0.5 m surveyed	essential
Aerodrome/Heliport elevation	0.5 m surveyed	essential
WGS-84 geoid undulation at aerodrome/heliport elevation position	0.5 m surveyed	essential
Runway threshold, non-precision approaches (A)	0.5 m surveyed	essential
FATO threshold, for heliports with or without a PinS approach (H)	0.5 m surveyed	essential
WGS-84 geoid undulation at runway threshold, non-precision approaches (A)	0.5 m surveyed	essential
WGS-84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports with or without a PinS approach (H)	0.5 m surveyed	essential
Runway threshold, precision approaches (A)	0.25 m surveyed	critical
WGS-84 geoid undulation at runway threshold, precision approaches (A)	0.25 m surveyed	critical
FATO threshold, for instrument heliports with non-precision and/or precision approaches. (H)	0.25 m surveyed	critical
WGS-84 geoid undulation at FATO threshold, TLOF geometric centre, for instrument heliports with non-precision and/or precision approaches. (H)	0.25 m surveyed	critical
Runway centre line points (A)	0.25 m surveyed	critical
Taxiway centre line/parking guidance line points (A)	1 m surveyed	essential
Helicopter ground taxiway centre line points and helicopter air taxiway points (H)	1 m surveyed	essential
Obstacles in Area 2 (the part within the aerodrome/heliport boundary)	3 m surveyed	essential
Obstacles in Area 3	0.5 m surveyed	essential
Distance measuring equipment/precision (DME/P)	3 m surveyed	essential

Table OPS 15: Data accuracy and integrity - elevation/altitude/height

GM3 ADR.OPS. A.010(c) (d) Data quality requirements

DATA ACCURACY AND INTEGRITY - DECLINATION AND MAGNETIC VARIATION

Declination/Variation	Accuracy Data Type	Integrity Classification
Aerodrome/Heliport magnetic variation	1 degree surveyed	essential
ILS localizer antenna magnetic variation	1 degree surveyed	essential
MLS azimuth antenna magnetic variation	1 degree surveyed	essential

Table OPS 16 : Data accuracy and integrity - declination and magnetic variation

GM4 ADR.OPS. A.010(c) (d) Data quality requirements

DATA ACCURACY AND INTEGRITY - BEARING

Bearing	Accuracy Data Type	Integrity Classification
ILS localizer alignment	1/100 degree surveyed	essential
MLS zero azimuth alignment	1/100 degree surveyed	essential
Runway bearing (True) (A)	1/100 degree surveyed	routine
FATO bearing (True) (H)	1/100 degree surveyed	routine

Table OPS 17 : Data accuracy and integrity - bearing

GM5 ADR.OPS. A.010(c) (d) Data quality requirements

DATA ACCURACY AND INTEGRITY - LENGTH/DISTANCE/DIMENSION

Length/Distance/Dimension	Accuracy Data Type	Integrity Classification
Runway length (A)	1msurveyed	critical
Runway width (A)	1msurveyed	essential
FATO length, TLOF dimensions (H)	1msurveyed	essential
Displaced threshold distance (A)	1msurveyed	routine
Stopway length and width (A)	1msurveyed	critical
Clearway length and width	1msurveyed	essential
Landing distance available	1msurveyed	critical
Take-off run available (A)	1msurveyed	critical

Length/Distance/Dimension	Accuracy Data Type	Integrity Classification
Take-off distance available	1msurveyed	critical
Accelerate-stop distance available (A)	1 m surveyed	critical
Helicopter rejected take-off distance available (H)	1 m surveyed	critical
Runway shoulder width (A)	1 m surveyed	essential
Taxiway width (A)	1 m surveyed	essential
Helicopter ground or air taxiway/taxi-route width (H)	1 m surveyed	essential
Taxiway shoulder width (A)	1 m surveyed	essential
ILS localizer antenna-runway end, distance (A)	3 m calculated	routine
ILS localizer antenna-FATO end, distance (H)	3 m calculated	routine
ILS glide slope antenna-threshold, distance along centre line	3 m calculated	routine
ILS marker-threshold distance	3 m calculated	essential
ILS DME antenna-threshold, distance along centre line	3 m calculated	essential
MLS azimuth antenna-runway end, distance (A)	3 m calculated	routine
MLS azimuth antenna-FATO end, distance (H)	3 m calculated	routine
MLS elevation antenna-threshold, distance along centre line	3mcalculated	routine
MLS DME/P antenna-threshold, distance along centre line	3 m calculated	essential

Table OPS 18 : Data accuracy and integrity - length/distance/dimension

GM1 ADR.OPS.A.010(d) Data quality requirements

RESOLUTION

(a) digital data needs to have sufficient resolution to maintain accuracy. Typically, if an accuracy of 0.1 unit is needed, then a resolution of 0.01 or 0.001 units would enable a data chain to preserve the accuracy without any issue. A finer resolution could be misleading as one could assume that it supports a finer accuracy. This factor range of 10 to 100 between accuracy and resolution is applicable regardless of the units of measurements used;

(b) The resolution should be enough to capture the accuracy of the data.

(c) Specifications concerning the accuracy and integrity classification related to aerodrome-related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.

(d) The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the tables above.

(e) In addition to the elevation (referenced to mean sea level) of the specific surveyed ground positions at aerodromes, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions as indicated in table above should be determined and reported to Aeronautical Information Services.

(f) Aerodrome mapping databases can be provided at one of two levels of quality — fine or medium. These levels and the corresponding numerical requirements are defined in RTCA Document DO-272B and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-99C — User Requirements for Aerodrome Mapping Information.

(g) Detailed specifications concerning digital data error detection techniques are contained in PANS-AIM (Doc 10066).

ADR.OPS.A.015 Coordination between aerodrome operators and providers of aeronautical information services

(a) To ensure that aeronautical information services providers obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, the aerodrome operator shall make arrangements to report to the relevant aeronautical information service providers, with a minimum of delay, the following:

(1) data relevant to the aerodrome and available services;

(2) information on the aerodrome conditions, disabled aircraft removal, rescue and firefighting and visual approach slope indicator systems;

(3) the operational status of associated facilities, services and navigational aids at the aerodrome;

(4) any other information considered to be of operational significance.

(b) Before introducing changes to the air navigation system, the aerodrome operator shall take due account of the time needed by the relevant aeronautical information services for the preparation, production and issue of relevant material for promulgation.

(c) Information on the condition of the movement area and the operational status of related facilities shall be provided to the appropriate aeronautical information services units, and similar information of operational significance to the air traffic services units, to enable those units to provide the necessary information to arriving and departing aircraft. The information shall be kept up to date and changes in conditions reported without delay.

AMC1 ADR.OPS.A.015(a)(b)(c) Coordination between aerodrome operators and providers of aeronautical information services

REPORTING

(a) The aerodrome operator should report on matters of operational significance or affecting aircraft and aerodrome operations in order to take appropriate action, particularly in respect of the following:

(1) construction or maintenance work;

(2) rough or broken surfaces on a runway, taxiway, or apron;

(3) water on a runway, a taxiway, or an apron;

(4) contaminants on a runway, taxiway, or apron;

(5) other temporary hazards, including parked aircraft;

(6) failure or irregular operation of part or all of the aerodrome visual aids;

(7) failure of the normal or secondary power supply;

(8) reduction in category of Rescue Fire Service;

(9) erection or removal of obstructions to air navigation, and erection or removal of significant obstacles in take-off, climb or approach areas;

(10) Information that a runway or portion thereof may be slippery when wet; and

(11) any other information of operational significance.

(b) In addition to (a) (1) to (11), a change in the level of protection normally available at an aerodrome for rescue and firefighting should be expressed in terms of the new category available at the aerodrome. When such a change has been corrected, the air traffic services provider and the aeronautical information services providers should be advised accordingly.

AMC1 ADR.OPS.A.015(a)(4) Coordination between aerodrome operators and providers of aeronautical information services

Aerodrome Operator should:

(a) Submit notification of any change to the aerodrome facility or equipment or the level of service at the aerodrome that has been planned in advance and that is likely to affect the accuracy of the information contained in any of the elements comprising the Integrated Aeronautical Information Package to the Aeronautical Information Service.

(b) Notify the Aeronautical Information Service, the geographical coordinates and the top elevation of all obstacles that penetrate the obstacle limitation surfaces as defined in this CAR. The information shall be kept up to date by periodic survey as mentioned in CAR ASP – Part ASSP.

(c) Provide information on the condition of the Movement Area and the operational status of related facilities to the Aeronautical Information Service, and similar information of operational significance to the Air Traffic Services Unit, to enable those units to provide the necessary information to arriving and departing aircraft. Of a particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system. The information shall be kept up to date and changes in conditions reported without delay.

AMC2 ADR.OPS.A.015(b) Coordination between aerodrome operators and providers of aeronautical information services

ADVANCE TIME FOR PROMULGATION

(a) The aerodrome operator should observe the predetermined, internationally agreed AIRAC effective dates in addition to 14-day postage time when submitting the raw information/data to aeronautical

information services that affect charts and/or computer-based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system.

(b) The aerodrome operator responsible for the provision of raw aeronautical information/data to the Aeronautical Information Service should do that while considering accuracy and integrity requirements for aeronautical data as specified in this CAR.

Note 1: AIRAC information is distributed by the Aeronautical Information Service at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

Note 2: The schedule of the predetermined internationally agreed AIRAC common effective dates at intervals of 28 days and guidance for the AIRAC use are contained in the ICAO Aeronautical Information Services Manual (Doc 8126).

GM1 ADR.OPS.A.015 Coordination between aerodrome operators and providers of aeronautical information services

(a) Detailed specifications concerning the AIRAC system are contained in PANS-AIM (Doc 10066), Chapter 6.

(b) Specifications for the issue of NOTAM and SNOWTAM are contained in Annex 15, Chapter 6 and PANS-AIM (Doc 10066), Appendices 3 and 4, respectively.

ADR.OPS.A.020 Common reference systems

For the purpose of air navigation, the aerodrome operator shall use:

(a) the World Geodetic System – 1984 (WGS-84) as the horizontal reference system. Reported aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum;

(b) the mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system;

(c) the Gregorian calendar and coordinated universal time (UTC) shall be used as the temporal reference systems. When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

GM1 ADR.OPS.A.020(a) Common reference systems

HORIZONTAL REFERENCE SYSTEM — WGS-84

(a) A reference system provides a definition of a coordinate system in terms of the position of an origin in space, the orientation of an orthogonal set of Cartesian axes, and a scale. A terrestrial reference system defines a spatial reference system in which positions of points anchored on the Earth's solid surface have coordinates.

(b) WGS-84 defines, inter alia, a conventional terrestrial reference system, a reference frame and a reference ellipsoid. WGS-84 is currently the reference system ICAO requires for georeferencing aeronautical information. Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

AMC1 ADR.OPS.A.020(b) Common reference systems

VERTICAL REFERENCE SYSTEM

(a) The aerodrome operator should use the Earth Gravitational Model — 1996 (EGM-96), as the global gravity model;

(b) When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, should be provided in the aeronautical information publication (AIP).

GM2 ADR.OPS.A.020(b) Common reference systems

MEAN SEA LEVEL

(a) The geoid globally most closely approximates mean sea level (MSL). It is defined as the equipotential surface in the gravity field of the Earth, which coincides with the undisturbed MSL extended continuously through the continents.

(b) Gravity-related heights (elevations) are also referred to as 'orthometric heights', while distances of points above the ellipsoid are referred to as 'ellipsoidal heights'.

(c) Global and local geoids differ in their origin: global geoids consider only the long- and middle-wave part of the Earth's gravity field, whilst local geoids also consider the short-wave part of the gravity field. Global geoids are used when consistent orthometric heights, over long distances (continent or earth surveying), are required. Currently, the world's best global geoid model is EGM 200846. It was determined using satellite tracking, gravity anomalies and satellite altimetry. Its accuracy is in the

range of ± 0.05 m (oceans) and ± 0.5 m (on land). This accuracy is higher in flat regions than in topographically.

GM1 ADR.OPS.A.020(c) Common reference system

TEMPORAL REFERENCE SYSTEM

(a) A value in the time domain is a temporal position measured relative to a temporal reference system.

(b) ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange, while ISO Standard 19108 prescribes the Gregorian calendar and UTC as the

ADR.OPS.A.030 Aeronautical data catalogue

When originating, processing or transmitting data to the AIS provider, the aerodrome operator shall ensure that the aeronautical data conform to the data catalogue specification.

GM1 ADR.OPS.A.030 Aeronautical data catalogue

AERONAUTICAL DATA CATALOGUE

The aeronautical data catalogue presents the scope of data that can be collected and maintained and provides a common terminology that can be used by data originators, aerodrome operators and AIS providers.

For more information on data catalogue refer to ICAO Doc 10066 PANS-AIM.

ADR.OPS.A.057 Origination of NOTAM

(a) The aerodrome operator shall:

(1) establish and implement procedures in accordance with which it originates a NOTAM issued by the relevant aeronautical information services provider:

(i) that contains information on the establishment, condition, or change of any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel involved with flight operations;

(ii) that contains information of a temporary nature and of short duration or that concerns operationally significant permanent changes or temporary changes of long duration that are made at short notice, except for extensive text or graphics, or both;

(2) designate aerodrome personnel, who have successfully completed relevant training and demonstrated their competence, to originate NOTAM and provide relevant information to the aeronautical information service providers with which it has arrangements;

(3) ensure that all other aerodrome personnel whose duties involve the use of NOTAM have successfully completed relevant training and demonstrated their competence to do so.

(b) The aerodrome operator shall originate a NOTAM when it is necessary to provide the following information:

(1) establishment of, closure of, or significant changes in the operation of aerodromes or runways;

(2) establishment of, withdrawal of, or significant changes:

(i) in the operation of the aerodrome services;

(ii) in the operational capability of radio navigation and air-ground communication services for which the aerodrome operator is responsible;

(iii) to visual aids

(3) unavailability of backup and secondary systems, having a direct operational impact;

(4) interruption of, or return to operation of, major components of aerodrome lighting systems;

(5) occurrence or correction of major defects or impediments in the manoeuvring area;

(6) changes to, and limitations on, the availability of fuel, oil and oxygen;

(7) establishment of, withdrawal of, or return to, operation of hazard beacons lights marking obstacles to air navigation;

(8) planned laser emissions, laser displays and search lights in the aerodrome surroundings,

if pilots' night vision is likely to be impaired;

(9) erecting or removal of, or changes to, obstacles to air navigation in the takeoff, climb, missed approach, approach areas, as well as on the runway strip;

(10) changes in aerodrome rescue and firefighting category;

(11) presence of, removal of, or significant changes in, hazardous conditions due to radioactive material, toxic chemicals, or water on the movement area;

(12) presence of a runway or portion thereof which is slippery wet; Information to be promulgated in a NOTAM includes specifying which portion of the runway is below the minimum friction level and its location on the runway;

(13) presence of a runway which is not available due to runway marking works; or information about the time lag required for making the runway available, if the equipment used for such works can be removed, when necessary;

(14) presence of hazards that affect air navigation, including presence of wildlife, obstacles, displays and major events.

(c) For the purposes of point (b), the aerodrome operator shall ensure that:

(1) NOTAM is originated with sufficient lead time for the affected parties to take any required action, except in the case of unserviceability, release of radioactive material, toxic chemicals and other events that cannot be foreseen;

(2) a NOTAM notifying unserviceability of associated facilities, services and navigation aids at the aerodrome, provides an estimate of the unserviceability period or of the time at which restoration of service is expected;

(3) within three months from the issuance of a permanent NOTAM, the information contained in the NOTAM is included in the aeronautical information products affected;

(4) within three months from the issuance of a temporary NOTAM of long duration, the information contained in the NOTAM is included in an AIP supplement;

(5) when a NOTAM with an estimated end of validity unexpectedly exceeds the three-month period, a replacement NOTAM is originated unless the condition is expected to last for a further period of more than three months; in that case, the aerodrome operator shall ensure that the information is published in an AIP supplement.

(d) In addition, the aerodrome operator shall ensure that:

(1) NOTAM text is composed of the significations or uniform abbreviated phraseology assigned to the ICAO NOTAM Code, complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language;

(2) information concerning standing water on the movement area is disseminated by means of SNOWTAM;

(3) when an error has occurred in a NOTAM, a NOTAM with a new number is originated to replace the erroneous NOTAM or the erroneous NOTAM is cancelled and a new NOTAM is originated;

(4) when a NOTAM is originated to cancel or replace a previous NOTAM:

(i) the series and number/year of the previous NOTAM are indicated;
(ii) the Location Indicators and subject of both NOTAM are the same;
(iii) only one NOTAM is cancelled or replaced by a new NOTAM;

(5) each originated NOTAM deals with only one subject and one condition of the subject;

(6) each originated NOTAM is as brief as possible and compiled so that its meaning is clear without the need to refer to another document;

(7) an originated NOTAM containing permanent or temporary information of long duration includes appropriate references to the AIP or AIP supplement;

(8) the ICAO Location Indicator included in the text of an originated NOTAM for the aerodrome is the one contained in the Location Indicators. A curtailed form of such indicators shall not be used.

(e) The aerodrome operator shall, following the publication of a NOTAM that it has originated, review its content to ensure its accuracy, and ensure the dissemination of the information to all relevant aerodrome personnel and organisations at the aerodrome.

(f) The aerodrome operator shall maintain records:

(1) of the NOTAM it originated and those that were issued;

(2) regarding the implementation of points (a)(2) and (3).

AMC1 ADR.OPS.A.057(a)(1) Origination of NOTAM

GENERAL

The Aerodrome operator's procedures should as a minimum:

(a) define the ways and means that the aerodrome operator may use to request the issuance of a NOTAM, in accordance with the arrangements that the aerodrome operator has with the aeronautical information service (AIS) provider(s). The procedures should clearly indicate the names of the aerodrome operator's personnel that have the authority to originate a NOTAM, and which should be included in the arrangements with the AIS provider.

(b) contain instructions regarding the:

(1) cases when a NOTAM should be originated by the aerodrome operator;

(2) completion of the NOTAM form (including the use of relevant electronic applications, if applicable) by the personnel designated by the aerodrome operator as NOTAM originators.

AMC1 ADR.OPS.A.057(a)(2)(3) Origination of NOTAM

INITIAL TRAINING FOR AERODROME PERSONNEL INVOLVED IN NOTAM ORIGINATION AND OTHER AERODROME PERSONNEL

(a) The theoretical part of the training of a person to be designated as a NOTAM originator should, as a minimum, cover the following areas:

(1) regulatory framework governing NOTAM origination and issuance, and its relationship with other aeronautical data products such as cases when the origination of a NOTAM is required;

(2) NOTAM form completion, including word abbreviations and phrase contractions applicable to NOTAMs;

(3) NOTAM types and understanding of NOTAM;

(4) use of electronic applications for initiating a NOTAM (if applicable); and

(5) aerodrome procedures for origination and internal dissemination of a NOTAM.

The theoretical training should be followed by an assessment of the trainees.

(b) Following the successful completion of the theoretical training, the practical part of the training should, as a minimum, include familiarisation with the origination of NOTAM and implementation of

the relevant aerodrome operating procedures for the persons to be designated as NOTAM originators.

(c) For other aerodrome personnel, whose duties require only the understanding of a NOTAM, the theoretical part of the training should be adjusted to their needs while the practical training should include practical examples to assess the level of their understanding. Both the theoretical and the practical training should be followed by an assessment of the person concerned.

GM2 ADR.OPS.A.057(b)(14) Origination of NOTAM

PRESENCE OF WILDLIFE

The permanent presence of wildlife hazards is to be contained in the AIP, whereas the notification of hazardous wildlife activity at short notice needs to be promulgated by NOTAM. When originating such a NOTAM, specific bird-related abbreviations should be avoided to facilitate readability and to prevent queries.

GM1 ADR.OPS.A.057(d)(1) Origination of NOTAM

NOTAM FORMAT

Information on the completion of a NOTAM format may be found in Chapter 6 of ICAO Doc 8126- 'Aeronautical Information Services Manual'. Information on the ICAO NOTAM code and abbreviations to be used may be found in ICAO Doc 8400 'Procedures for Air Navigation Services - ICAO Abbreviations and Codes' (PANS ABC).

GM1 ADR.OPS.A.057 Origination of NOTAM

INSTANCES WHERE NOTAM NEED NOT BE ISSUED

The following are example cases where the aerodrome operator may not originate a NOTAM:

(a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;

(b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;

(c) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;

(d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;

(e) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;

(f) the lack of apron marshalling services and road traffic control;

(g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

(h) parachuting when in uncontrolled airspace under VFR (see 6.3.2.3 m)), when controlled, at promulgated sites o rwithin danger or prohibited areas;

(i) training activities by ground units;

(j) unavailability of back-up and secondary systems if these do not have an operational impact;

(k) limitations to airport facilities or general services with no operational impact;

(l) national regulations not affecting general aviation;

(m) announcement or warnings about possible/potential limitations, without any operational impact;

(n) general reminders on already published information;

(o) availability of equipment for ground units without containing information on the operational impact for airspace andfacility users;

(p) information about laser emissions without any operational impact and fireworks below minimum flying heights;

(q) closure of movement area parts in connection with planned work locally coordinated of duration of less than one hour;

(r) closure or unavailability of, or changes in, operation of aerodrome(s)/heliport(s) outside the aerodrome(s)/heliport(s)operational hours; and

(s) other non-operational information of a similar temporary nature.

Information which relates to an aerodrome and its vicinity and which does not affect its operational status may be distributed locally during pre-flight or in-flight briefing or other local contact with flight crews. Thus, in case of need, the aerodrome operator may disseminate such type of information through the AIS provider it has arrangements with.

ADR.OPS.A.060 Reporting of surface contaminants

The aerodrome operator shall report to the aeronautical information services and the air traffic services units, when applicable, on matters of operational significance affecting aircraft and aerodrome operations on the movement area, which includes the presence of water or other contaminants.

ADR.OPS.A.065 Reporting of runway surface condition

(a) The aerodrome operator shall assess and report the runway surface condition over each third of the runway using a runway condition report (RCR). The report shall include a runway condition code (RWYCC) using numbers 0 to 6, the contaminant coverage and depth, and a description using the following terms:

(1) DRY

(2) STANDING WATER

(3) WET

Note 1: The conditions, either singly or in combination with other observations, are criteria for which the effect on aeroplane performance is sufficiently deterministic to allow assignment of a specific runway condition code;

Note 2: Presence of 'LOOSE SAND': The term 'LOOSE SAND' do not appear in the aeroplane performance calculation section but are used in the situational awareness section of the RCR.

(b) The assessment process shall include:

(1) assessing and reporting the condition of the movement area;

(2) providing the assessed information in the correct format; and

(3) reporting significant changes without delay.

(c) Reporting shall commence when a significant change in runway surface condition occurs due to water.

(d) Reporting of the runway surface condition shall continue to reflect significant changes until the runway is no longer contaminated. When that situation occurs, the aerodrome operator shall issue an RCR that states that the runway is wet or dry as appropriate.

(e) Friction measurements shall not be reported.

(f) When a paved runway or portion thereof is slippery wet, the aerodrome operator shall make such information available to the relevant aerodrome users. That shall be done by originating a NOTAM and shall describe the location of the affected portion.

(g) For aerodromes with multiple runways the aeroplane performance section for each individual runway shall be reported from the date and time of the assessment for each runway before the information in the situational awareness section.

(h) Personnel assessing and reporting runway surface shall be trained and competent to perform their duties.

AMC1 ADR.OPS.A.065(a) Reporting of the runway surface condition

REPORTING

(a) The aerodrome operator should disseminate an RCR through the aeronautical information services and air traffic services, when the runway is wholly or partly contaminated by standing water.

(b) When the runway is wet, not associated with the presence of standing water, the assessed information should be disseminated using the RCR through the air traffic service.

AMC2 ADR.OPS.A.065(a) Reporting of the runway surface condition

RUNWAY CONDITION REPORT (RCR)

(a) The RCR should consist of the:

(1) aeroplane performance calculation section; and

(2) situational awareness section.

(b) The information should be included in an information string in the following order using only AIS compatible characters in a Runway Condition Report. The Runway Condition Report consist of:

(1) aeroplane performance calculation section:

(i) aerodrome location indicator;

(ii) date and time of assessment;

(iii) lower runway designation number;

(iv) RWYCC for each runway third;

(v) per cent coverage contaminant for each runway third;

(vi) depth of loose contaminant for each runway third;

(vii) condition description for each runway third; and

(viii) width of runway to which the RWYCCs apply if less than the published width.

(2) Situational awareness section:

(i) reduced runway length;

(ii) loose sand on the runway;

(iii) taxiway conditions;

(iv) apron conditions; and

(v) plain-language remarks.

GM1 ADR.OPS.A.065(a) Reporting of the runway surface condition

GENERAL

(a) Assessing and reporting the condition of the movement area and related facilities is necessary in order to provide the flight crew with the information needed for safe operation of the aeroplane. The RCR is used for reporting assessed conditions through the issuance of SNOWTAM, when necessary.

(b) Generally, movement areas are exposed to a multitude of climatic conditions and consequently there is a significant difference in the conditions to be reported. The RCR describes a basic structure applicable for all these climatic variations. Assessing the runway surface condition relies on a great variety of techniques and no single solution can apply to every situation.

(c) The philosophy of the RCR is that the aerodrome operator assesses the runway surface condition whenever water is present on an operational runway. From this assessment, a RWYCC and a description of the runway surface are reported, which can be used by the flight crew for aeroplane performance calculations. This format, based on the type, depth and coverage of contaminants, is the best assessment of the runway surface condition by the aerodrome operator; however, all other pertinent information is taken into consideration and kept up to date, and changes in conditions are reported without delay.

(d) The RWYCC reflects the runway braking capability as a function of the surface conditions. With this information, the flight crew can derive, from the performance information provided by the aeroplane manufacturer, the necessary stopping distance of an aircraft on the approach under the prevailing conditions.

GM2 ADR.OPS.A.065(a) Reporting of the runway surface condition

RUNWAY CONDITION REPORT

(a) An example of a complete information string prepared for dissemination is as follows:

[COM header and abbreviated header] (Completed by AIS)

GG OMRSBZQZX

070645 OMRSYNYX

SWEA0151 OMRS 02170055

SNOWTAM 0151

[Aeroplane performance calculation section] (Completed by the Aerodrome Operator)

OMRS 02170055 12L 2/2/2 100/100/100 4/4/4 STANDING WATER/STANDING WATER/STANDING WATER

OMRS 02170135 12R 5/5/5 100/100/100 NR/NR/NR WET/WET/WET

[Situational awareness section] Completed by the Aerodrome Operator)

TWY B POOR. APRON NORTH POOR.

(b) AEROPLANE PERFORMANCE CALCULATION SECTION

The aeroplane performance calculation section is a string of grouped information, separated by a space ‘ ’ ending with a return and a two-line feed ‘<<=’, in order to distinguish the aeroplane performance calculation section from the following situational awareness section or the following aeroplane performance calculation section of another runway.

The information to be included in this section consists of the following:

(1) **Aerodrome location indicator:** a four-letter ICAO location indicator in accordance with ICAO Doc 7910 ‘Location Indicators’.

This information is mandatory.

Format: nnnn

(2) **Date and time of the assessment**: date and time (UTC) when the assessment was performed.

This information is mandatory.

Format: MMDDhhmm

(3) **Lower runway designation number**: a two- or three-character number identifying the runway for which the assessment is carried out and reported.

This information is mandatory.

Format: nn[L] or nn[C] or nn[R]

(4) **Runway condition code for each runway third**: a one-digit number identifying the RWYCC assessed for each runway third. The codes are reported in a three-character group separated by a '/' for each third. The direction for listing the runway thirds is the direction as seen from the lower designation number.

This information is mandatory.

When transmitting information on the runway surface condition by air traffic services to flight crews, the sections are, however, referred to as the first, second or third part of the runway. The first part always means the first third of the runway as seen in the direction of landing or take-off as illustrated in Figures 1 and 2.

Format: n/n/n

Example: 5/5/2

(5) **Per cent coverage contaminant for each runway third**: a number identifying the percentage coverage. The percentages are to be reported in an up-to nine-character group separated by a '/' for each runway third. The assessment is based upon an even distribution within the runway thirds using Table 1.

This information is conditional. It is not reported for any runway third that is dry or covered with less than 10 per cent.

Format: [n]nn/[n]nn/[n]nn

Example: 25/50/100

In case of uneven distribution of the contaminants, additional information is given in the plain-language remark part of the situational awareness section of the RCR. Where possible, a standardised text is used.

When no information is to be reported, 'NR' is inserted at the relevant position of the message, to indicate to the user that no information exists.

(6) **Depth of loose contaminant:** standing water for each runway third: a two- or three-digit number representing the assessed depth (mm) of the contaminant for each runway third. The depth is reported in a six-to nine-character group separated by a '/' for each runway third as defined in Table 2 of AMC1 ADR.OPS.A.065(b);(c). The assessment is based upon an even distribution within the runway thirds following an assessment. If measurements are included as part of the assessment process, the reported values are still reported as assessed depths.

This information is conditional. It is reported only for STANDING WATER.

Format: [n]nn/[n]nn/[n]nn

(7) **Condition description for each runway third**: to be reported in capital letters using the terms specified in ADR.OPS. A.065 point (a). The condition types are separated by an oblique stroke '/'.

This information is mandatory.

Format: nnnn/nnnn/nnnn

(8) Width of runway to which the RWYCCs apply if less than the published width: two-digit number representing the width of cleared runway in metres.

This information is conditional.

Format: nn

If the cleared runway width is not symmetrical along the centre line, additional information is given in the plain-language remark part of the situational awareness section of the RCR.

(c) SITUATIONAL AWARENESS SECTION

All individual messages in the situational awareness section end with a full-stop sign, in order to distinguish the message from subsequent message(s).

The information to be included in this section consists of the following:

(1) Reduced runway length

The information is conditional when a NOTAM has been published with a new set of declared distances affecting the landing distance available (LDA).

Format: Standardised fixed text – RWY nn [L] or nn [C] or nn [R] LDA REDUCED TO [n]nnn

(2) Loose sand on the runway

This information is conditional.

Format: RWY nn[L] or nn[C] or nn[R] LOOSE SAND

(3) Taxiway conditions

This information is optional.

Format: TWY [nn]n POOR or TWYS[nn]n/[nn]n/… POOR or ALL TWYS POOR

(4) Apron conditions

This information is conditional.

Format: APRON [nnnn] POOR or APRONS [nnnn]/[nnnn]/… POOR or ALL APRONS POOR

(5) Plain-language remarks using only allowable characters in capital letters

Where possible, standardised text is used.

This information is optional except for the conditional information ‘UPGRADED’ or ‘DOWNGRADED’ used whenever the assessed RWYCC differs from what follows directly from the runway condition assessment matrix (RCAM). When present, this information is to be the first piece of information of the plain language remarks in order to ease readability and to recognise its importance as part of the situational awareness prior to aeroplane performance calculations.

Format: Combination of allowable characters where use of full stop '.' marks the end of the message.

Allowable characters:

A B C D E F G H I J K LM N O P Q R S T U V W X Y Z

0 1 2 3 4 5 6 7 8 9

/ [oblique stroke] '.' [period]' '[space]

Note: For reasons of simplicity winter condition items have not been amended to UAE regulations. For detailed information refer to ICAO Annex 14, Attachment A, ICAO Circular 355 AN/211 Assessment, Measurement and Reporting of Runway Surface Conditions and ICAO PANS Aerodromes (Doc 9981).

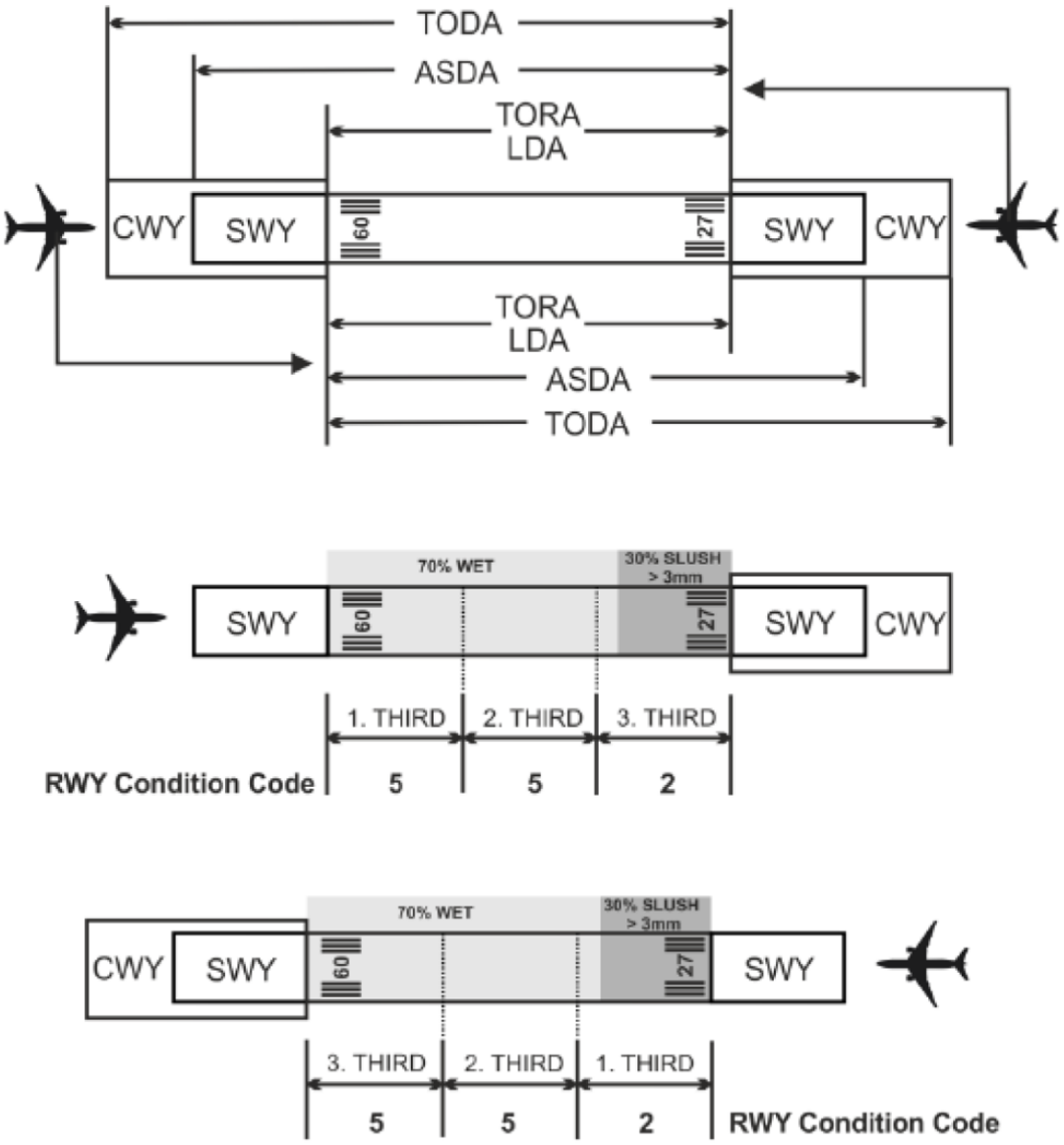


Figure OPS 26 : Reporting of RWYCC from Air traffic services to flight crew for runway thirds

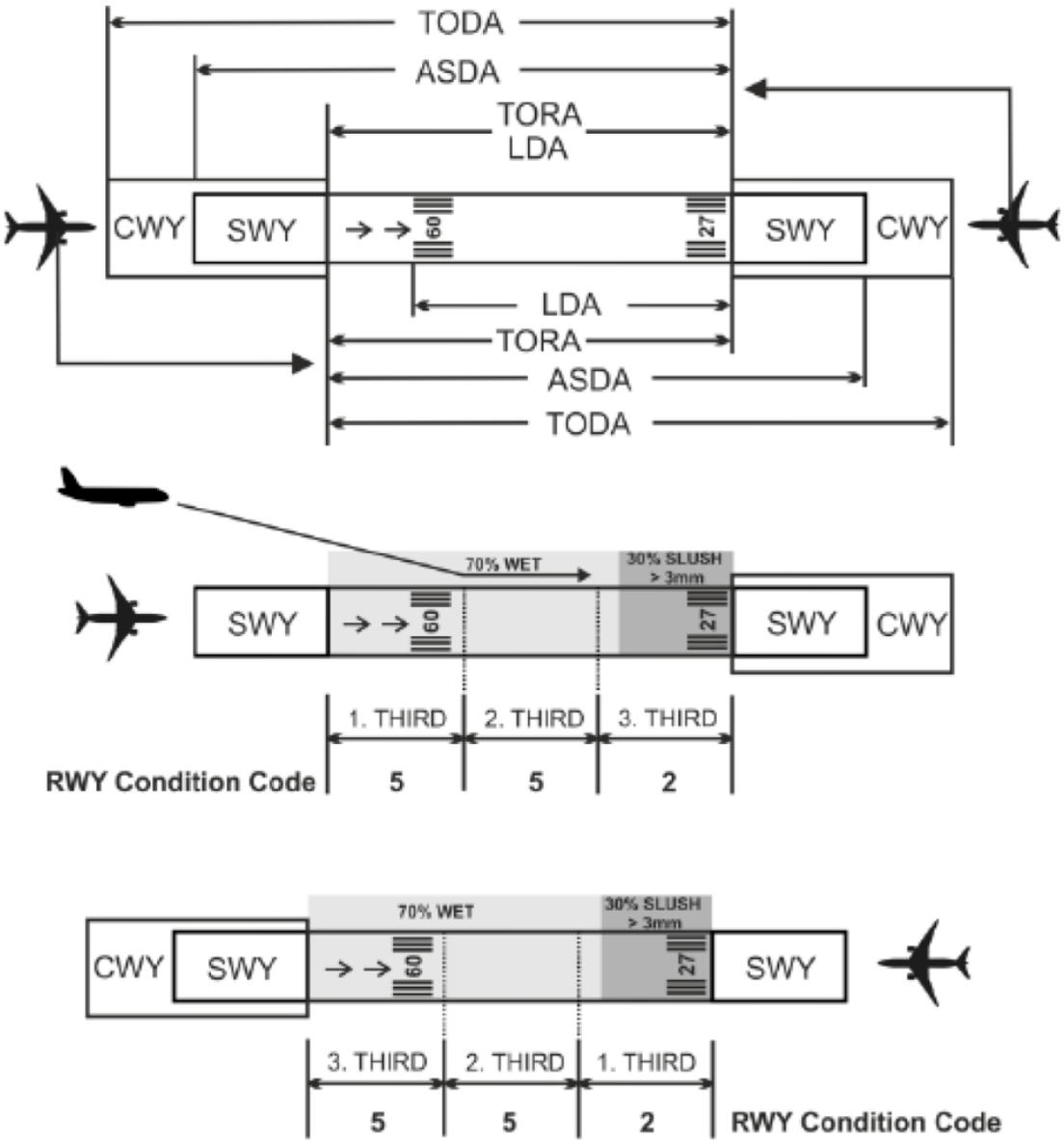


Figure OPS 27: Reporting of RWYCC from Air traffic services to flight crew for runway thirds with displaced threshold

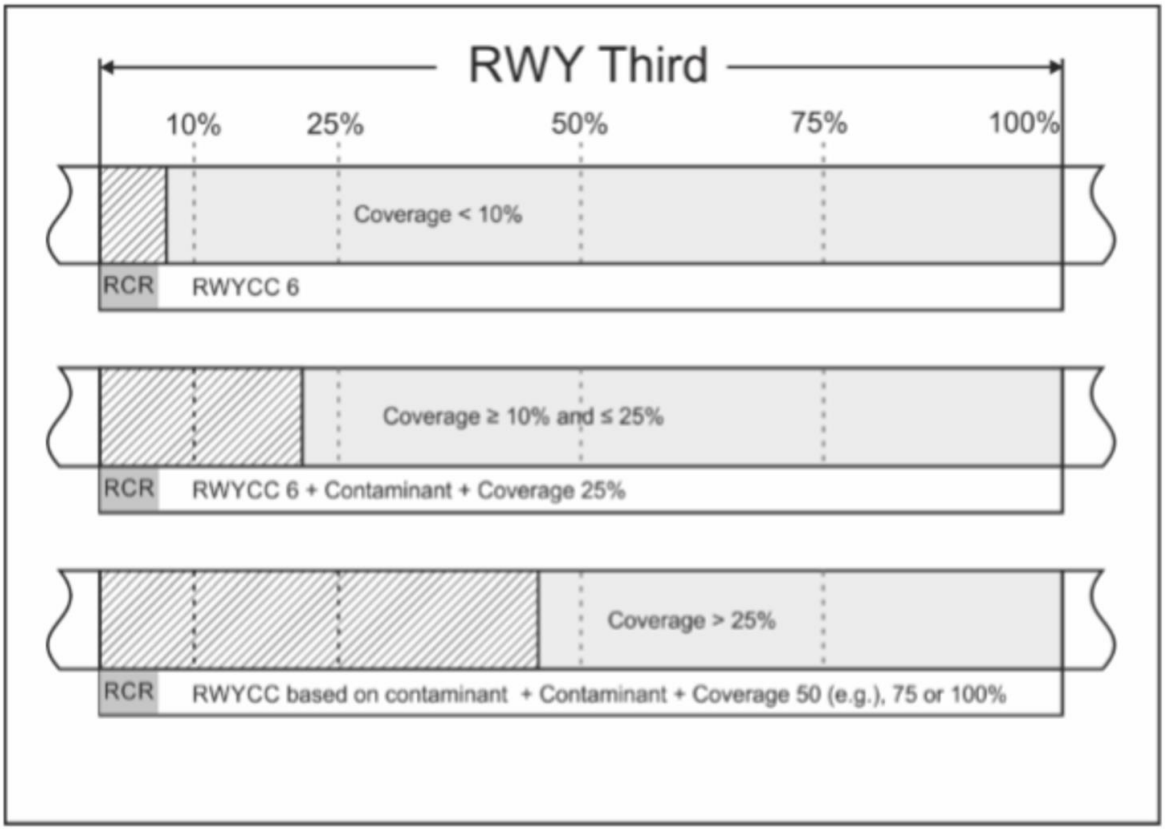


Figure OPS 28 : Single contaminant

GM3 ADR.OPS.A.065(a) Reporting of the runway surface condition

REPORTING BY AERODROMES WITH MULTIPLE RUNWAYS

On aerodromes with multiple runways, RCR/ SNOWTAM should include all the runways, in case that at least one runway is contaminated. This improves pilots' situational awareness and support their decision on the selection of the landing/take-off runway.

AMC1 ADR.OPS.A.065(b);(c) Reporting of the runway surface condition

SIGNIFICANT CHANGES

A change in the runway surface condition used in the RCR is considered significant whenever there is any:

(a) change in the RWYCC;

(b) change in the contaminant type;

(c) change in reportable contaminant coverage according to Table OPS 19 ;

(d) change in contaminant depth according to Table OPS 20; and

(e) other information, for example a SPECIAL AIR-REPORT of runway braking action, which according to assessment techniques used, is known to be significant.

Assessed per cent	Reported per cent
10-25	25
26-50	50
51-75	75
76-100	100

Table OPS 19: Percentage coverage of contaminants

Contaminant	Valid values to be reported	Significant change
STANDING WATER	04, then assessed value	3mm

Table OPS 20: Dept assessment of contaminants (For full table refer to ICAO Doc 9981)

Note 1: For STANDING WATER, 04 (4 mm) is the minimum depth value at and above which the depth should be reported. From 3 mm and below, the runway third should be considered WET.

Note 2: Above 4 mm for STANDING WATER an assessed value should be reported and a significant change relates to the observed change from this assessed value.

GM1 ADR.OPS.A.065(b)(c) Reporting of the runway surface condition

EXAMPLE OF REPORTING DEPTH OF CONTAMINANT WHENEVER THERE IS A SIGNIFICANT CHANGE

After the first assessment of runway condition, a first RCR is generated	5/5/5 100/100/100 NR/NR/NR WET/WET/WET
With continuing precipitation, a new RCR is required to be generated as a subsequent assessment reveals the depth of contamination has increased from 2 mm to 5 mm along the entire	2/2/2 100/100/100 05/05/05 STANDING WATER/STANDING WATER/STANDING WATER

length of the runway and therefore a change in the RWYCC is needed. A second RCR is therefore created	
(c) With even more precipitation, a further assessment reveals the depth of contamination has increased from 5 mm to 7 mm along the entire length of the runway. However, a new RCR is not required because the RWYCC has not changed	No change to RCR as the change in depth is less than the significant change threshold of 3 mm
Next assessment of the contamination reveals that the depth has increased to 10 mm. A new RWYCC is required because the change in depth from the last RCR (second RWYCC), i.e. from 5 mm to 10 mm is greater than the significant change threshold of 3 mm. A third RCR is thus created	2/2/2 100/100/100 10/10/10 STANDING WATER/STANDING WATER/STANDING WATER

(a) For runway conditions other than STANDING WATER, the depth is not reported. The position of this type of information in the information string is then identified by /NR/.

(b) Whenever an operational runway is contaminated, an assessment of the contaminant depth and coverage over each third of the runway shall be made and reported.

(c) When the depth of the contaminants varies significantly within a runway third, additional information is to be given in the language remark part of the situational awareness section of the RCR.

GM1 ADR.OPS.A.065(e) Reporting of runway surface condition

USE OF FRICTION MEASUREMENTS

Friction measurements cannot be used by flight crews to determine landing performance requirements, because there is no correlation between the measurements and aeroplane performance data. Nevertheless, continuous friction measuring devices may be used, together with all other available means, to support upgrade or downgrade of the RWYCC, by using friction measurements in a comparative way and not as absolute values.

ADR.OPS.A.070 Information on the aerodrome lighting system

The aerodrome operator shall report to the aeronautical information services the information on the parts of the aerodrome lighting system where light units are light emitting diode (LED) lights.

GM1 ADR.OPS.A.070 Information on the aerodrome lighting system

GENERAL

Enhanced Flight Vision System (EFVS) technology relies on the infrared heat signature provided by incandescent lights. The replacement of incandescent lights with LED lights may render the use of EFVS not possible. This information is important to aircraft operators to assess the suitability of the runway in order to conduct EFVS operations.

ICAO Annex 15 protocols provide an appropriate means of notifying aerodrome users of EVS when lighting systems are converted to LED.

ADR.OPS.A.075 Charts

The aerodrome operator, either directly or through arrangements with third parties, shall ensure that charts relevant to the aerodrome are published in the AIP by the aeronautical information service provider.

ADR.OPS.A.080 Information on radio navigation and landing aids

(a) The aerodrome operator shall ensure, either directly or through arrangements with third parties, that information on the radio navigation and landing aids associated with the instrument approach and the terminal area procedures at the aerodrome, are provided to the aeronautical information services.

(b) The information referred to in point (a) shall include the following:

(1) type of aids;

(2) magnetic variation to the nearest degree, as appropriate;

(3) type of supported operation for ILS/MLS/GLS, basic GNSS and SBAS;

(4) classification for ILS;

(5) facility classification and approach facility designation(s) for GBAS;

(6) for VOR/ILS/MLS also station declination to the nearest degree used for technical line-up of the aid;

(7) identification, if required;

(8) frequency(-ies), channel number(s), service provider and reference path identifier(s) (RPI(s)), as appropriate;

(9) hours of operation, as appropriate;

(10) geographical coordinates in degrees, minutes, seconds and tenths of seconds of the position of the transmitting antenna, as appropriate;

(11) elevation of the DME transmitting antenna to the nearest 30 m (100 ft) and of the distance-measuring equipment precision (DME/P) to the nearest 3 m (10 ft), elevation of GBAS reference point to the nearest meter or foot, and the ellipsoid height of the point to the nearest meter or foot; for SBAS, the ellipsoid height of the landing threshold point (LTP) or the fictitious threshold point (FTP) to the nearest meter or foot;

(12) service volume radius from the GBAS reference point to the nearest kilometer or nautical mile; and

(13) remarks.

SECTION B – AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS (ADR.OPS.B)

ADR.OPS.B.001 Provision of services

The services under this Subpart shall be provided at the aerodrome by the aerodrome operator directly or through third -parties.

GM1 ADR.OPS.B.001 Provision of services

SERVICES

(a) The services included in this subpart that are needed to be provided at an aerodrome. In some cases, these services are not directly provided by the aerodrome operator, but by another organisation or service provider or combination of both. However, the aerodrome operator, being responsible for the operation of the aerodrome should have arrangements and interfaces with these organisations or entities to ensure that these services are provided according to the legal requirements.

(b) The method described above meets with the intention of an integrated Safety Management System that helps the aerodrome operator to ensure the safety objective of the service provision is being met.

ADR.OPS.B.003 Handover of activities – Provision of operational information

(a) The aerodrome operator shall establish and implement procedures for the handover of operational activities between personnel involved in the operation and maintenance of the aerodrome to

ensure that all new incoming personnel are provided with operational information related to their tasks.

(b) The aerodrome operator shall establish and implement procedures to provide organisations operating or providing services at the aerodrome, with aerodrome-related operational information that may affect the execution of the tasks of the personnel of such organisations.

(c) Handover of activities during planned short-term absence of post holders,

(1) The Aerodrome Operator shall ensure that the accountabilities, responsibilities, and duties of the relevant Post Holder are adequately re-assigned to an alternate to ensure continued effectiveness of the management system;

(2) The Post Holder shall notify the GCAA 's Principal Inspector of their planned absence and contact details of the alternate.

AMC1 ADR.OPS.B.003 Handover of activities – Provision of operational information

HANDOVER OF OPERATIONAL ACTIVITIES — PERSONNEL BRIEFING

(a) The aerodrome operator's procedures for the handover of operational activities should as a minimum:

(1) cover the change of a shift within the same function (e.g. between RFFS personnel), as well as the case where a task is handed over to another person within the same shift, and the cases where an activity is handed over between different functions (e.g. from maintenance to operations);

(2) address the case when a planned activity (e.g. light maintenance) is not completed at the time of a planned shift change; or any other non-regular activity is in place; and

(3) allow for the preparation of both outgoing and incoming personnel.

(b) The briefing should be in a manner that allows effective two-way communication between the outgoing and incoming personnel, during which all task-relevant information necessary for the incoming personnel is provided to them. In the case of posts which are not continually manned, or aerodromes with interrupted working hours, the briefing may be in writing, while ensuring that additional information may be provided to the incoming personnel in case of such need.

(c) The briefing of drivers and other operational personnel operating on the manoeuvring area should, as a minimum, include:

(1) the runway(s) in use;

(2) any significant works areas in place, or being established or removed that day;

(3) conditions of stop bars, if applicable, that may be inoperable making a taxiway unusable for runway entry or crossing; and

(4) if low-visibility procedures are in force.

GM1 ADR.OPS.B.003 Handover of activities – Provision of operational information

PROVISION OF OPERATIONAL INFORMATION TO OTHER ORGANISATIONS

(a) Given that changes of the operating conditions at an aerodrome may affect all personnel operating on the movement area, there is a need to ensure that the personnel of other organisations which operate or provide services at the aerodrome are also provided with the necessary operational information, which pertains to their operating environment. Therefore, the aerodrome operator needs to provide this type of information to such organisations, so that they are enabled to relay it to their own personnel. It is important that there is no delay in the provision of such information by the aerodrome operator, and that it is done in a manner prearranged with the other organisations, to ensure it reaches its destination.

(b) Such information may include changes in the operating conditions on the apron (e.g. due to works or occurrences) or on the manoeuvring area, or other facilities of the aerodrome.

ADR.OPS.B.005 Crisis management, business continuity and emergency planning

The aerodrome operator shall establish and implement crisis management, business continuity and emergency plans that:

(a) commensurate with the type of aircraft operations and other activities conducted at the aerodrome;

(b) sufficiently provide for the command, control, communication and coordination of appropriate organisations in response to the impact of an emergency occurring at an aerodrome or in its surroundings;

(c) contain sufficient procedures for periodic testing of the adequacy of the plans and for reviewing the results in order to improve its effectiveness; and

(d) comply with all relevant CAR AGA, Part ACM requirements.

ADR.OPS.B.010 Rescue and firefighting services

The aerodrome operator shall ensure that:

(a) aerodrome rescue and firefighting facilities, equipment and services are provided to meet the requirements of declared level of protection;

(b) adequate equipment, fire extinguishing agents and sufficient personnel are available in a timely manner;

(c) rescue and firefighting personnel are properly trained, equipped and qualified to operate in the aerodrome environment;

(d) rescue and firefighting personnel potentially required to act in aviation emergencies demonstrate their fitness to execute their functions satisfactorily, taking into account the type of activities at the aerodrome;

(e) training programme and proficiency checks for personnel involved in rescue and firefighting services at the aerodrome; and

(f) comply with all relevant CAR AGA, Part ACM requirements.

ADR.OPS.B.015 Monitoring and inspection of movement area and related facilities

(a) The aerodrome operator shall regularly monitor the condition of the movement area and the operational status of related facilities and report on matters of operational significance, whether of a temporary or permanent nature, to the relevant air traffic services providers and aeronautical information services providers as applicable.

(b) The aerodrome operator shall carry out regular inspections of the movement area and its related facilities including the runway strip, RESA and other associated safety area.

(c) Aerodrome operator shall maintain records of all routine, non-routine inspections, which shall be carried out by competent staff only.

AMC1 ADR.OPS.B.015 Monitoring and inspection of movement area and related facilities

GENERAL

(a) The aerodrome operator should establish a monitoring and inspection program of the movement area which is commensurate with the traffic expected at the aerodrome in order to identify any irregularity or potential hazards to the safety of aircraft or aerodrome operations. Such programmes should be established in coordination with the relevant air traffic service provider.

(b) The aerodrome operator, during excessive weather events (excessive heat, following a significant storm, etc.) should be conducting extra inspections of paved areas to check for pavement hazards and debris that could damage aircraft, or cause pilots to lose directional control.

(c) Inspections must also be carried out under the following circumstances:

(1) as soon as practicable, after any aircraft accident or incident;

(2) during any period of construction or repair of the aerodrome facilities or equipment that is critical to the safety of aircraft operation;

(3) at any other time when there are conditions at the aerodrome that could affect aviation safety;

(4) whenever the runway surface conditions may have changed significantly due to meteorological conditions;

(5) special air reports received from pilots;

(6) upon request from ATC.

(d) Surface inspection should be conducted following any significant maintenance activity (e.g. surface enrichment course, large scale repairs, repainting of markings) conducted on the area and before it is returned to service.

(e) When there are indications that the serviceability of a runway may be reduced because of poor drainage, additional assessment should be conducted. This assessment differs in that water depths in the poorly drained areas are normally greater in local rain conditions. The results are thus more appropriate to identify problem areas having poor drainage values that could induce hydroplaning.

AMC1 ADR.OPS.B.015(b) Monitoring and inspecting of movement area and related facilities

REQUIREMENTS AND PROCEDURES FOR MOVEMENT AREA INSPECTIONS

(a) The aerodrome operator should designate the personnel responsible for carrying out movement area inspections.

(b) The aerodrome operator should ensure that all vehicles on the manoeuvring area are in radio contact with the appropriate air traffic services either directly or through an escort.

(c) In order to prevent runway incursions, the aerodrome operator should have procedures in place, which have been coordinated with the air traffic services unit, for conducting runway inspections, communication procedures, actions in case of radio communication or transponder failure or vehicle breakdown, stop bars crossing, including in cases of stop bar unserviceability, runway crossings, etc. Runway inspections should be conducted in the opposite direction to that being used for landing or taking off and without interruption, unless it is operationally not feasible.

(d) The aerodrome operator should ensure that personnel conducting movement area inspections should be trained in, at least, the following areas:

(1) aerodrome familiarisation, including aerodrome markings, signs, and lighting;

(2) aerodrome Manual;

(3) aerodrome Emergency Plan;

(4) Notice to Airmen (NOTAM) initiation procedures;

(5) aerodrome driving rules;

(6) procedures for radiotelephony, phraseology and ICAO phonetic alphabet;

(7) aerodrome inspection procedures and techniques;

(8) procedures for reporting inspection results and observations;

(9) basic understanding of air traffic services procedures on the movement area; and

(10) low-visibility and adverse weather procedures.

(e) Personnel conducting runway surface condition assessments, in addition to the training specified above, should be trained in, at least, the following areas:

(1) procedures for completion/initiation of RCR;

(2) type of runway contaminants and reporting;

(3) awareness of the impact of runway surface condition assessment on aircraft performance.

Following the successful completion of the theoretical training, the practical part of the training to be provided should consider the individual needs of the trainees, and should include the practical application of the theoretical training. After the completion of the practical training, a competency assessment should take place.

GM1 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

PAVEMENTS AND ADJACENT GROUND SURFACES INSPECTION

(a) Paved Areas Inspection - The following should be observed during an inspection of paved areas:

(1) general cleanliness with particular attention to material which could cause engine ingestion damage. This may include debris from runway maintenance operations, or excessive grit remaining after runway gritting;

(2) presence of contaminants such as mud, dust, sand, oil, rubber deposits which may impair the runway surface friction characteristics;

(3) signs of damage to the pavement surface including cracking and spall of concrete, condition of joint sealing, cracking and looseness of aggregate in asphalt surfaces, or break-up of friction courses;

(4) after rain, flooded areas should be identified and marked, if possible, to facilitate later resurfacing;

(5) damage of light fittings;

(6) cleanliness of runway markings;

(7) the condition and fit of pit cover; and

(8) the extremities of the runway should be inspected for early touchdown marks; blast damage to approach lights, marker cones and threshold lights; cleanliness and obstacles in the runway end safety area.

(b) Adjacent ground surfaces inspection

The following may be observed during the inspection:

(1) the general state of ground cover vegetation ensuring, in particular, that excessive length is not obscuring lights, signs, markers, etc.;

(2) any developing depressions should be noted and plotted for necessary remedial action;

(3) any unreported aircraft wheel tracks should be carefully plotted and reported;

(4) the condition of signs and markers;

(5) the general bearing strength of grass / unpaved areas, particularly those area close to aircraft pavement surface;

(6) waterlogged areas; and

(7) FOD and wildlife.

AMC2 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

VISUAL CHECK FOR OBSTACLES

(a) Aerodrome operators should include visual checks of aerodrome's immediate vicinity and surroundings (within line of sight) to identify objects that may pose a hazard to operations and if so report to the designated persons or organisations for their immediate intervention.

(b) All authorised obstacles should be checked for proper lighting and marking.

(c) Any unauthorised obstacles should be reported to the designated persons or organisations for their immediate intervention, including removal of the obstacle.

AMC3 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

REQUIREMENTS FOR MOVEMENT AREA INSPECTIONS

(a) Aerodrome operator should use checklists covering the various inspection areas. Unless other acceptable methods are used, a sketch of the aerodrome should accompany the checklist so that the location of problems can be marked for easy identification.

(b) Person(s) conducting the inspections should review the most recently completed checklist from the previous inspection cycle prior to beginning the inspection.

(c) If construction or works are in progress, person(s) conducting the inspections should be familiar with the safety plan of the construction or works.

AMC4 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

INSPECTION VEHICLE

The aerodrome operator should ensure that the vehicle used for manoeuvring area inspection is in full working order and meets the requirement of the vehicle permit scheme and be appropriately equipped for operations on the manoeuvring area including, but not limited to, the following;

(a) airfield maps;

(b) inspection checklists;

(c) radio and alternate means to communicate;

(d) radio failure procedure;

(e) lost on airfield procedure (low visibility);

(f) FOD collection container;

(g) standing water depth measuring tool;

(h) Personal Protective Equipment (PPE) Gloves etc.; and

(i) tools for the use of immediate rectification (i.e. shovel for the removal of animal carcass and to remove vegetation obscuring signs and markings).

(j) bird identification guide.

GM2 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

VEHICLE USED FOR INSPECTION

During the inspection of the runway a sterile environment should be adopted with only essential communication conducted within the vehicle, with clearance, co-ordination and co-operation from ATC.

AMC5 ADR.OPS.B.015(b) Monitoring and inspection of movement area and related facilities

FOLLOW-UP OF INSPECTIONS

Arrangements should exist for reporting the results of inspections, and for taking prompt follow-up actions to ensure correction of unsafe conditions. These arrangements could include, depending on the result or observation, notification to air traffic services and aeronautical information services, removal of FODs, wildlife control, recording of events for further analysis according to the aerodrome operator's SMS requirements, etc.

AMC1 ADR.OPS.B.015(a)(b) Monitoring and inspection of movement area and related facilities

FREQUENCY OF INSPECTION

(a) Inspections of the runways covering items such as the presence of FOD, the status of visual aids, wildlife and current surface conditions, should be carried out at least twice each day.

Where the total number of movements is 250 or more, then not less than four inspections in a day should be carried out.

(b) Daily inspection of taxiways should be carried out.

(c) Inspections covering other items such as other lighting systems required for the safety of aerodrome operations, pavements and adjacent ground surfaces, drainage and storm water collection systems, fencing and other access control devices, the movement area environment inside the aerodrome boundary and outside the aerodrome boundary within line of sight, should be carried out, at least, weekly.

AMC2 ADR.OPS.B.015(a)(b) Monitoring and inspection of movement area and related facilities

TIER INSPECTION SYSTEM

Apart from daily routine inspections, Aerodrome operator shall carry out regular focused supervisory inspections which will include management, operations post holder or their delegated representative(s) and senior management personnel. Therefore, a three-level inspection system should be carried out.

GM1 ADR.OPS.B.015(a)(b) Monitoring and inspection of movement area and related facilities

TIER INSPECTION SYSTEM

Arrangements should be made by the aerodrome operator to carry out

(1) Tier 1 – Airfield Operations Inspections

These inspections consist of the daily routine inspections of the movement area. These inspections should also cover the strips and other safety area associated with the runways and taxiways ,RESA(s), aprons, aircraft stands, associated infrastructure, and include a basic AGL check and apron lighting check.

Each inspection should be recorded. Records of the inspections should be reviewed daily by the airfield Duty Manager. Any item that requires rectification, identified defect or unserviceability should be reported to the concerned appropriate department for the necessary action and/or rectification.

(2) Tier 2 – Airside Surface Inspections

These are more detailed inspections of the movement area. The movement area should be divided into smaller areas with the whole airfield covered over a 4-week period. These inspections are best carried out on foot. The inspection should be recorded on the 2nd tier inspection report forms which should mention the details of defects/deficiencies and actions arising from the inspection.

(3) Tier 3 – Airside Operations Management Inspections

Tier 3 inspections are carried out by the Senior Operations Management Team, any other relevant management personnel covering the entire movement area at least twice a year. The inspections are best carried out on foot. The inspection should be recorded on the 3-tier inspection report forms which should mention the details of defects/deficiencies and actions arising from the inspection.

GM2 ADR.OPS.B.015(a)(b) Monitoring and inspection of movement area and related facilities

The inspection procedures should also cater to allow a full runway inspection, including area between side strip and the runway side of the holding position to be carried out preferably without interruption, and should address the need to effectively inspect unidirectional lights.

AMC1 ADR.OPS.B.015(c) Monitoring and inspection of movement area and related facilities

INSPECTION RECORDS AND LOGS

The aerodrome operator should keep a log for all routine and non-routine inspections of the movement area and related facilities.

The inspection log should include:

(a) details of inspection intervals and times;

(b) names of persons carrying out the inspection; and

(c) results and observations, if any, including requirement for maintenance intervention be indicated, the location, extent, and results should be recorded.

All appropriate records, including completed checklist of inspections are kept for a period as mentioned in AD.OR.D.035 from the date of inspections.

ADR.OPS.B.016 Foreign object debris control programme

(a) Aerodrome Operators shall

(1) develop and implement specific procedures and programmes for the elimination of the risk of FOD;

(2) ensure that organisations operating and providing service at the aerodrome are included in the programme and they shall also ensure that any third party operating on the aerodrome can demonstrate a satisfactory level of FOD awareness and that their working procedures do not increase the likelihood of FOD;

(3) ensure that FOD is a standing agenda item for all safety related committees;

(4) establish and implement measures to prevent generation of FOD;

(5) establish and implement procedures to:

(i) detect FOD, including the monitoring and inspection of the movement area or adjacent areas in accordance with an inspection schedule and whenever such an inspection is required due to activities, weather phenomena, or occurrences that may have led to the generation of FOD;

(ii) provide all relevant means necessary to promptly remove, contain, and dispose FOD;

(iii) notify as soon as possible to the aircraft operators in the case of identified aircraft parts;

(iv) collect and analyse data and information to identify FOD sources and trends, and implement corrective or preventive measures, or both, to improve the effectiveness of the programme.

(b) As part of the FOD control programme, the aerodrome operator shall:

(1) ensure personnel awareness and participation, and that such personnel have successfully completed relevant training and demonstrated their competence;

(2) ensure that all organisations performing actives in the aerodrome include FOD prevention in their induction and continuation training programmes, for their staff.

AMC1 ADR.OPS.B.016 Foreign object debris control programme

GENERAL

(a) The FOD control programme should be actively supported by the senior management of the aerodrome operator and of the other organisations operating or providing services at the aerodrome.

(b) The aerodrome operator should designate an individual within the aerodrome organisation to manage the aerodrome's FOD control programme.

AMC1 ADR.OPS.B016(a) Foreign object debris control programme

FOD PREVENTION MEASURES

The aerodrome operator should identify activities that may be associated with the generation of FOD, as well as measures that should be taken in order to prevent this from happening. A record of the analysis made should be maintained.

AMC2 ADR.OPS.B.16(a) Foreign object debris control programme

FOD DETECTION, REMOVAL, CONTAINMENT AND DISPOSAL

The aerodrome operator should include the procedures for FOD detection in the aerodrome manual. The procedures should, where necessary, be coordinated with the air traffic services provider and should:

(a) ensure that FOD detection is part of the established inspection schedule of the movement area, and that:

(1) periodic FOD inspections on foot are carried out to increase the effectiveness of detection, and to inspect areas inaccessible by vehicle~~;~~

(2) additional inspections are carried out:

(i) in construction areas;

(ii) immediately after any aircraft or vehicle accident or incident;

(iii) following any material spill;

(iv) during, and after, extreme weather events (e.g. excessive heat~~,~~ following a significant storm, etc.);

(b) ensure that an inspection of an aircraft stand is carried out prior to the arrival and departure of an aircraft, in order to detect and remove any FOD present;

(c) ensure that cabin waste is properly secured, and any waste from aircraft maintenance activities is removed upon completion of the activities;

(d) ensure that FOD detection is performed in a timely manner and that it includes the identification of the FOD source and its location;

(e) ensure that aerodrome personnel are notified to remove detected FOD from the manoeuvring area, and describe how the air traffic services provider is notified to take appropriate action;

(f) describe clearly when runway or taxiway operations have to be suspended, and the coordination required with the air traffic services provider;

(g) ensure that FOD is removed as soon as possible after detection. FOD removal should be included in the tasks of all personnel operating on the aerodrome; and

(h) describe the actions required to notify aircraft operators of any aircraft parts identified.

AMC3 ADR.OPS.B.16(a)(5)(iv) Foreign object debris control programme

FOD ANALYSIS — CONTINUOUS IMPROVEMENT

(a) FOD identified and collected on the aerodrome should be recorded, analysed and evaluated. To record the location of the FOD,. When needed, an investigation should be carried out to identify the source of the FOD. The sources of FOD, including their location and the activities generating FOD on

the aerodrome, should be identified, recorded and analysed to identify trends and problem areas as well as to focus the efforts of the FOD control programme. Relevant records, including of the actions taken, should be maintained.

(b) The FOD control programme should be periodically reviewed to assess and continually improve its effectiveness. The programme should be updated based on the feedback received, data analysis results and trends identified through the evaluation of FOD collected at the aerodrome.

AMC1 ADR.OPS.B016(b)Foreign object debris control programme

FOD PREVENTION

(a) Personnel awareness

Personnel should be kept aware through appropriate activities of the existence of the FOD control programme, and should be actively encouraged to identify and report potential FOD hazards, act to remove observed FOD, and propose solutions to mitigate related safety risks.

(b) Personnel training

The FOD training programme should aim at increasing the personnel awareness of the causes and effects of FOD damage and to promote their active participation in eliminating FOD during the performance of daily work routines.

(1) The theoretical part of the initial FOD training programme should cover the following areas:

(i) safety of aircraft, personnel and passengers as they relate to FOD;

(ii) overview of the FOD control programme in place at the aerodrome;

(iii) causes and principal contributing factors of FOD creation;

(iv) the consequences of ignoring FOD, and/or the incentives for preventing FOD;

(v) practicing ‘clean-as-you-go’ work habits and the general cleanliness and inspection standards of work areas;

(vi) FOD detection procedures, including the proper use of detection technologies (if applicable);

(vii) requirements and procedures for the regular inspection and cleaning of movement areas;

(viii) FOD removal procedures;

(ix) proper care, use, and stowage of material and component or equipment items used around aircraft while in servicing, maintenance or on aerodrome surfaces;

(x) control of debris in the performance of work assignments;

(xi) control over personal items and equipment;

(xii) proper control/accountability and care of tools and hardware;

(xiii) how to report FOD incidents or potential incidents; and

(xiv) continuous vigilance for potential sources of FOD.

The theoretical training should be followed by an assessment of the trainees .

(2) Following the successful completion of the theoretical training, the practical part of the training to be provided should consider the individual needs of the trainees, according to the responsibilities/tasks of the personnel, and, as a minimum, should include familiarisation with the tools/equipment used for the removal/containment/prevention of FOD, and the implementation of the relevant aerodrome operating procedures related to the programme. Following the completion of the practical training, a competency assessment should take place.

GM1 ADR.OPS.B016(a)(4) Foreign object debris control programme

FOD PREVENTION MEASURES

FOD may be produced by many activities and may be generated by personnel, aerodrome infrastructure (pavements, lights and signs), the environment (e.g. wind, heavy rain), aircraft, vehicles, or other equipment operating at the aerodrome. The elements below have also the potential to become sources of FOD on an aerodrome.

(a) Aircraft servicing and maintenance activities

During the activities related to the aircraft servicing, various types of FOD may be generated and be left or transferred on the apron, service roads, and other operational areas. Such items may

include small luggage parts, cabin waste, plastic or metallic items, etc. FOD may also be generated by vehicles or the equipment that operates in these areas.

To control this type of FOD, measures need to include securing and removing cabin waste from the aircraft stand. Cabin waste would not be left unattended on the apron, especially near aircraft stands.

Moreover, cabin waste need not be disposed of using the FOD containers provided, as cabin waste may attract wildlife. To this end, the handling of cabin waste should be organised so that a damage of the rubbish bag is not likely to attract wildlife on the apron.

Similarly, during aircraft maintenance, FOD may be generated either in the form of waste or small items inadvertently left on the apron such as rivets, bolts, tools, etc. Procedures to address this may include measuring of tools, use of toolboxes, checklists, removal of waste produced upon the completion of the maintenance activities, etc.

Inspection of the aircraft stand or other areas that may have been used for aircraft servicing or maintenance, before and after the departure of the aircraft is an effective measure. The secure installation of suitable FOD bins, in appropriate locations, for depositing FOD is also an effective preventive measure.

(b) Cargo areas

In a cargo area, there is a high potential for blowing debris such as cargo strapping and plastic sheeting. Procedures to contain such debris, possibly by installing (and monitoring) catch fencing where appropriate, may help to control the environment. FOD trapped by such fences should be removed regularly.

(c) Construction activities

During construction activities, several materials (rocks, tools, vehicle parts, etc.) have the potential to become FOD if transferred by vehicles, weather phenomena, etc. on the movement area or other operational areas. For this reason, specific FOD prevention procedures need to be established and employed for each construction project. These procedures would be based on the proximity of the construction activities to the movement area and other operational areas, but in general would stress containment and regular cleaning of construction debris.

Aerodrome pre-construction planning would include means for controlling and containing FOD generated by the construction. This is especially true in high-wind environments where debris is more likely to become airborne.

The designated routes of construction vehicles on the movement area need to be planned so as to avoid or minimise crossing in critical areas of aircraft operations. If high-risk crossings cannot be avoided, subsequent provisions such as an increased frequency of FOD inspections could be implemented.

Contractors need to understand and comply with the requirements regarding the control and removal of FOD. To facilitate compliance with these requirements, the aerodrome operator should consider drafting FOD control guidance for all construction projects taking place within the movement area or nearby areas. Standard and project-specific FOD measures include:

(1) requiring contractors to cover all loads;

(2) requiring contractors to secure any loose items that could easily blow away or control dust through spraying of water;

(3) ensuring the proper functioning of storm drains throughout the construction;

(4) specifying whether any mechanical FOD removal devices will be required;

(5) specifying how monitoring for FOD hazards will be accomplished; and

(6) requirements for inspecting and removing FOD from tyres prior to traversing operational areas.

(d) Aerodrome maintenance operations

Maintenance operations routinely disturb the vegetation and soil in areas adjacent to those used aircraft. Therefore, procedures to remove this debris, such as the use of an assigned aerodrome sweeper or personnel on foot using shovels to repair vegetation and soil, need to be implemented.

Aerodrome lighting, pavement, and marking maintenance operations may generate concrete/asphalt debris as well as increase the potential for dropped repair parts, tools, and other items stored on the maintenance vehicles. Corrective procedures may include the use of aerodrome sweepers and the inspection of the worksite after maintenance is completed.

(e) Pavements and other aerodrome surfaces may be prone to generating FOD

(1) Pavements

(i) Deteriorating pavements can exhibit spalling or cracks. For example, pieces of concrete can break loose from pavements or FOD can develop from fatigue corner cracks.

(ii) The service roads that cross taxiways may generate FOD from the vehicles using them, especially in the case of construction operations.

(iii) Special attention should be paid to the cleaning of cracks and pavement joints.

(iv) Asphalt and concrete pavements may be the most common source of FOD on an aerodrome; therefore, effective pavement maintenance practices are important for the prevention of FOD.

(2) Other aerodrome surfaces

Grass areas and ditches may collect and hold large amounts of light debris such as paper, cardboard, plastic and various containers that can originate from terminal aprons, cargo ramps and hangar ramps. This debris can blow back into areas used by aircraft unless collected in a timely manner.

Unpaved areas adjacent to pavements may require compaction, as appropriate, to prevent FOD from jet wash.

FOD fences may collect debris on windy days. This FOD should be collected before the wind increases or changes direction and the debris that blows back on to areas used by aircraft.

(f) Vehicle operational activities

Vehicles used for operational reasons, e.g. preventive maintenance, wildlife management, and which may need to frequently move on surfaces that contain material that could be FOD in the movement area. Thus, procedural (e.g. inspection/cleaning of tyres) or technical (development of surfaces at predetermined points that help the removal of FOD from tyres) measures may be taken to address this potential FOD source.

GM2 ADR.OPS.B.16(a)(5) Foreign object debris control programme

FOD DETECTION AND REMOVAL

FOD detection

(a) In addition to the standard inspections, personnel on the movement area need to employ a 'clean-as-you-go' technique, by looking for FOD during their regular duties.

(b) When inspections occur at night, additional lights/lighting systems on vehicles are beneficial to better detect FOD.

(c) Whenever possible, vehicles involved in FOD detection activities, are only driven on clean, paved surfaces. If a vehicle needs to be driven on unpaved surfaces, the driver needs to ensure that the vehicle's tires do not transport FOD (e.g. mud or loose stones) back onto the pavement.

(d) Encouraging the participation of the personnel of other organisations such as air operators, ground handling companies, air traffic services providers in inspections may reinforce the concept that FOD control is a team effort and demonstrates the aerodrome operator's commitment to a FOD-free environment. This practice may help increase familiarity with local aerodrome conditions, and promotes effective communication between the aerodrome operator and its stakeholders.

FOD removal

(a) FOD may be removed either manually or by using mechanical equipment, such as sweepers, vacuum systems, jet air blowers, magnetic bars, FOD 'sweeping carpets', etc.

(b) FOD containers need to be able to withstand strong winds and be of a 'closed-type' to prevent the wind from dislodging their content. Suggested locations for FOD containers are: near all entry points to the apron area, in hangars, aircraft maintenance areas, near aircraft stands and baggage areas. Clearly identified FOD storage locations increase the likelihood that collected debris will be deposited by personnel. Access to the FOD containers should not be blocked.

GM3 ADR.OPS.B.16 Foreign object debris control programme

FOD DESCRIPTION

As FOD may be composed of different materials, when reporting, a proper description is made to allow for the proper identification of the FOD source areas, as well as for the appropriate mitigation measures to be taken.

FOD may be items from the following, non-exhaustive, list:

(a) aircraft and engine fasteners (nuts, bolts, washers, safety wire, etc.);

(b) aircraft parts (fuel caps, landing gear fragments, oil sticks, metal sheets, trapdoors, and tyre fragments);

(c) mechanics' tools;

(d) catering supplies;

(e) personal items (personnel badges, pens, pencils, luggage tags, drink cans, etc.);

(f) apron items (paper and plastic debris from catering and freight pallets, luggage parts, and debris from ramp equipment);

(g) runway and taxiway materials (concrete and asphalt chunks, rubber joint materials, and paint chips);

(h) construction debris (pieces of wood, stones, fasteners and miscellaneous metal objects);

(i) plastic and/or polyethylene materials;

(j) natural materials (e.g. plant fragments, inanimate wildlife).

ADR.OPS.B.020 Wildlife strike hazard reduction

Aerodrome operator shall:

(a) assess the wildlife hazard on, and in the surrounding, of the aerodrome; and the assessments are carried out by competent personnel;

(b) establish and implement a Wildlife Hazard Management Plan to minimise or eliminate wildlife hazards;

(c) establish means and procedures to minimise the risk of collisions between wildlife and aircraft, at the aerodrome;

(d) notify the GCAA of all wildlife strike;

(e) notify the GCAA and Appropriate Authority(ies) if a wildlife assessment indicates conditions in the

surroundings of the aerodrome are conducive to a wildlife hazard problem.

(f) The wildlife strike hazard on, or in the vicinity of, an aerodrome shall be assessed through:

(1) the establishment of a procedure for recording and reporting wildlife strikes to aircraft;

(2) the collection of information from aircraft operators, aerodrome personnel and other sources on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations.

GM1 ADR.OPS.B.020(a) Wildlife strike hazard reduction

WILDLIFE RISK ASSESSMENT

(a) The aerodrome operator should:

(1) conduct a risk assessment using strike data for each species, as well as information on the presence of species, the number of individuals, and their biology, and update this regularly;

(2) take into account the number of strikes for each species and the severity of damage arising from those strikes; and

(3) target actions on those species which are present with the highest frequency and create the greatest damage.

(b) Wildlife risk assessments should be made by qualified personnel.

(c) Procedures on the management of wildlife hazards on and in the vicinity of an aerodrome, including the establishment of a wildlife hazard management programme (WHMP), wildlife risk assessment, land-use management and personnel training, are specified in the PANS-Aerodromes (Doc 9981), Part II, Chapters 1 and 6. Further guidance is given in the Airport Services Manual (Doc 9137), Part 3.

GM1 ADR.OPS.B.020(a) Wildlife strike hazard reduction

TRAINING FOR WILDLIFE CONTROL PERSONNEL

(a) The aerodrome wildlife control personnel should receive formal training prior to their initial engagement as wildlife controllers.

(b) Training for aerodrome wildlife control should be documented and records of it should be retained to satisfy periodic reviews, audits, and competence checks.

(c) Training of aerodrome wildlife control personnel should be conducted by qualified aerodrome wildlife control personnel, or specialists with proven experience in this field.

(d) Wildlife control initial training should, at least, address the following general areas:

(1) an understanding of the nature and extent of the aviation wildlife management problem, and local hazard identification;

(2) an understanding of the national and local regulations, where applicable, standards, and guidance material related to aerodrome wildlife management programs (use of best-practice models);

(3) appreciation of the local wildlife ecology and biology, including (where applicable) the importance of good airfield grass management policies, and the benefits they can deliver to wildlife control;

(4) the importance of accurate wildlife identification and observations, including the use of field guides;

(5) local and national laws and regulations relating to rare and endangered species, and species of special concern, and the aerodrome operators' policies relating to them;

(6) wildlife strike remains collection, and identification policies and procedures;

(7) long-term (passive) control measures, including on and off aerodrome habitat management, including identification of wildlife attractions, vegetation policies, air navigation aids protection, and drainage system, and water body management practicalities;

(8) short-term (active) tactical measures, using well established effective wildlife removal, dispersal, and control techniques;

(9) documentation of wildlife activities and control measures, and reporting procedures (the aerodrome wildlife management plan);

(10) use of personal protective equipment; and

(11) wildlife strike risk assessment and risk management principles, and how these programs integrate with the aerodrome's safety management system.

~~(e)~~ Wildlife control staff should be fully aware of the conditions and terms of the operations of the aerodrome environment.

(f) It should be ensured that wildlife control staff maintains competence in the role. This could be achieved either by training or another system of monitoring. The maintenance of competence should include the areas in (d) and (e) above,
and also include:

(1) Reviewing the use of wildlife deterrent tools ;

(2) changes in the local environment;

(3) changes in risk management policy;

(4) recent wildlife events at the aerodrome;

(5) improvements in active and passive measures; and

(6) any other matters the aerodrome operator deems appropriate.

AMC1 OPS.B.020(b) Wildlife strike hazard reduction

GENERAL

The aerodrome operator should:

(a) participate in the relevant national committees ;

(b) establish procedures to record and report wildlife strikes to aircraft occurred at the aerodrome, in close cooperation with organisations operating, or providing services at the aerodrome;

(c) ensure that wildlife hazard assessments are made by competent personnel; and

(d) establish, implement and maintain a wildlife risk management programme.

AMC2 OPS.B.020(b) Wildlife strike hazard reduction

WILDLIFE HAZARD MANAGEMENT PLAN

Aerodrome operator should implement their wild life hazard management plan that should include process to :

(a) eliminate or to prevent the establishment of garbage disposal dumps or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates

that they are unlikely to create conditions conducive to a wildlife hazard problem; and where the elimination of existing sites is not possible ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable;

(b) assess the potential bird strike risk;

(c) reduce wildlife infestation on the aerodrome as much as practicable;

(d) implement a safeguarding system to identify, and, where possible, address existing and planned developments within the vicinity of the aerodrome – at least within 13 kilometers from the Aerodrome Reference Point, that may have the potential to increase the bird strike risk;

(e) monitor and address wildlife activity, strike events;

(f) promulgating information to Aeronautical Information Services in regard to the presence of birds constituting a potential hazard to aircraft operations;

(g) strive to improve the effectiveness of the plan through on-going evaluation by competent personnel.

AMC3 OPS.B.020(b) Wildlife strike hazard reduction

WILDLIFE HAZARD MANAGEMENT PLAN

A Wildlife Hazard Management Plan shall include as a minimum:

(a) description for assessing any wildlife hazards;

(b) description for preventative/corrective action to mitigate risks;

(c) description for bird hazard/risk management;

(d) description for preventative/corrective action for bird risks;

(e) description for reporting bird strikes to the GCAA

(f) procedure to assess the potential bird strike risk;

(g) bird Hazard Circle Map radiating outward 13 km from the Aerodrome Reference Point; and

(h) procedure for promulgating information to Aeronautical Information Services in regard to the presence of birds constituting a potential hazard to aircraft operations.

GM1 ADR.OPS.B.020(c) Wildlife strike hazard reduction

WILDLIFE RISK MANAGEMENT PROGRAMME

The wildlife risk management programme should cover an area of at least 13 km (7 NM) from the aerodrome reference point, and should include, at least, the following elements:

(a) assignment of personnel:

(1) a person who is accountable for developing and implementing the wildlife risk programme;

(2) a person who oversees the daily wildlife control activities, and analyses the collected data and carries out risk assessments in order to develop and implement the wildlife risk management programme; and

(3) trained and qualified staff who detect and record the birds/wildlife, and assess the bird/wildlife hazard, and expel hazardous birds/wildlife;

(b) a process to report, collect, and record data of struck and living birds/wildlife;

(c) a process to analyse the data and to assess the bird/wildlife hazard to develop mitigation, proactive, and reactive measures. This should include a risk assessment methodology;

(d) a process of habitat and land management both on, and in its surroundings, whenever possible, in order to reduce the attractiveness of the area to birds/wildlife;

(e) a process to remove hazardous birds/wildlife;

(f) a process for liaison with non-aerodrome agencies and local landowners, etc. to ensure the aerodrome is aware of developments that may contribute to creating additional bird hazards within the surrounding of the aerodrome's infrastructure, vegetation, land use and activities (for example crop harvesting, seed planting, ploughing, establishment of land or water features, hunting, etc. that might attract birds/wildlife).

AMC1 OPS.B.020(d) Wildlife strike hazard reduction

REPORTING OF WILDLIFE STRIKE

In the event of a wildlife strike (including bird strike), the Aerodrome Operator shall use the ROSI system and/ or any other system as established by the GCAA to make mandatory reports to the GCAA.

GM1 ADR.OPS.B.020(d) Wildlife strike hazard reduction

RECORDING AND REPORTING OF WILDLIFE STRIKES AND OBSERVED WILDLIFE

(a) It is necessary to maintain a record of all wildlife activity or 'bird/wildlife log'. The log should include, at least, the following information:

(1) numbers, species, and location of birds/wildlife seen; and

(2) actions taken to disperse birds/wildlife, and the results of these actions.

(b) The log should be completed at regular intervals by the wildlife control staff.

(c) The log should be analysed to identify which species represent a hazard, at which times of day or year, or under which weather conditions, etc.

(d) The aerodrome operator should have a system in place to collect bird/wildlife strike reports in close cooperation with data owners, like aircraft operators, air navigation service providers, aircraft engine maintenance departments, etc.

GM1 ADR.OPS.B.020 Wildlife strike hazard reduction

Procedures on the management of wildlife hazards on and within the vicinity of aerodromes, including the establishment of a wildlife hazard management programme (WHMP), wildlife risk assessment, land-use management and personnel training, are specified in the PANS-Aerodromes (Doc 9981), Part II, Chapters 1 and 6. Further guidance is given in the Airport Services Manual (Doc 9137), Part 3.

ADR.OPS.B.024 Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

(a) the driving of a vehicle on any part of the movement area or other operational areas of an aerodrome shall require an authorisation (Airside Driver Permit –ADP), issued to the driver by the operator of that aerodrome, except as provided for in point (e). The driving authorisation may be issued to a person who:

(1) is employed with an organisation authorised to operate at the aerodrome and is allocated tasks that involve driving in such areas;

(2) holds a valid UAE driving licence, and any other licence required for the operation of specialised vehicles;

(3) has successfully completed a relevant driving training programme and demonstrated his or her competence in accordance with (c);

(4) has demonstrated language proficiency in accordance with point ADR.OPS.B.029, if that person intends to drive a vehicle on the manoeuvring area;

(5) has received training by their employer on the use of the vehicle intended to operate at the aerodrome;

(6) Medically fit to drive;

(b) An Aerodrome Operator shall establish a system to define the validity period of driving authorization, specify the conditions for their renewal, circumstances under which a permit will cease to be a valid and requirements for surrender of the driver's authorisation.

(c) The aerodrome operator shall establish and implement a driving training programme for drivers who operate on the airfield, , the training programme shall:

(1) be appropriate to the characteristics and operation of the aerodrome, the driver's functions and tasks to be performed, and the areas of the aerodrome that drivers may be authorised to operate;

(2) include theoretical and practical training of adequate duration., in at least the area as included in CAR AGA, Part-TRG);

(3) assess the competency of the drivers.

(d) A driving authorisation issued shall specify the parts of the movement area or other operational areas on which the driver is allowed to drive and shall remain valid as long as:

(1) the requirements of points (a)(1) to (a)(6) are met;

(2) the holder of the driving authorisation:

(i) undergoes and successfully completes training and proficiency checks in accordance with the requirements of this CAR .

(ii) where applicable, continues to demonstrate the required language proficiency in accordance with point ADR.OPS.B.029 – Language proficiency.

(e) Notwithstanding point (a), the aerodrome operator may permit a person to temporarily drive a vehicle on the movement area or other operational areas if:

(1) that person holds a valid driving licence, and any other licence required for the operation of specialised vehicles; and

(2) that vehicle is escorted by a vehicle driven by a driver authorised in accordance with point (a).

(f) The aerodrome operator shall:

(1) establish a system and implement procedures for:

(i) for issuing and revoking airside driver permits.

(ii) temporarily permitting the driving of vehicles;

(iii) ensuring that drivers to whom a driving authorisation has been issued, continue to maintain their competencies;

(iv) monitoring the compliance of drivers with any driving requirements applicable at the aerodrome and for taking appropriate action, including the suspension and revocation of driving authorisations or permissions to temporarily drive a vehicle.

(2) maintain relevant records.

(g) Aerodrome Operator shall ensure that they have in place a system for the promulgation of Information to all ADP holders regarding any changes on the airfield that may impact upon airside driving.

(h) The aerodrome operator in coordination with the ANSP shall establish a system of allocating RTF call signs to be used by vehicles, so that the potential for confusion between vehicles and aircraft is minimized. This is particularly important at aerodromes where the RTF frequency used by vehicles is the same as that used by aircraft, or where the RTF frequency used by vehicles is re-broadcast on the RTF frequency used by aircraft.

AMC1 OPS.B.024 Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

GENERAL - ROLES AND RESPONSIBILITIES

(a) Aerodrome Operator

It is the responsibility of the aerodrome operator to establish and implement procedures for the training, assessment and authorisation of all drivers operating and for vehicles permitted on the movement area. These procedures are required to be documented within the Aerodrome Manual and should include:

(1) details of the applicable traffic rules (including speed limits and the means of enforcement of the rules);

(2) details of vehicle serviceability requirements;

(3) a description of the method for issuing driving permits for operating vehicles in the Movement Area; and

(4) a description of the method for issuing vehicle permits/authorisation for vehicles and ground service equipment. Special attention needs to be given for the types of vehicles/equipment that will remain airside;

(b) Nominated Person

The Post Holder Operations, as the process owner, is responsible to ensure the implementation, maintenance and enforcement of the aerodrome's airside driving permit scheme. Further, the Post Holder Operations is responsible to ensure that the safety management system principles and procedures of the aerodrome operator are applied to the continuous improvement and development of the aerodrome's ADP scheme.

(c) Stakeholders

Stakeholders are responsible for ensuring that the company and its drivers meet the criteria stated in the ADP Scheme document issued by the Aerodrome Operators, and that its drivers hold a valid ADP.

Stakeholders are also responsible for ensuring that any change to the company or drivers' circumstances that may have an effect on any of the requirements of the ADP scheme is communicated to the aerodrome operator in a timely manner.

(d) Airside Driver Permit Holder

All applicants for an ADP should hold a current UAE Driver's License applicable to the vehicle they intend to operate, and be fully conversant with the relevant rules, procedures and instructions of the aerodrome(s) where they drive, whilst ensuring they meet all requirements as stated.

The ADP procedure should include recognition of a "Certificate of Competence" for specialist vehicles such as ground handling equipment, e.g. aircraft tugs and high loaders, in addition to the UAE driving licence.

Any change to the driver's circumstances that may have an effect on their ADP should be communicated to their company in a timely manner. It is also the driver's responsibility to notify their company if their UAE Driver's License is suspended or disqualified.

AMC1 ADR.OPS.B.024(a)(5) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

SPECIFIC TRAINING OF DRIVERS ON THE USE OF VEHICLES OR EQUIPMENT

(a) A driver needs to receive specific training on the use of any vehicle or equipment, he or she will be using during his or her duties, e.g. special vehicle, tug, high loader, coach, etc. Upon completion of this training, the responsible organisation should provide the relevant records to the aerodrome operator.

(b) If the driver is to be assigned a new vehicle type following the issuance of the authorisation, the process of point (a) should be repeated prior to allowing the driver to operate the new vehicle.

AMC1 ADR.OPS.B.024(a)(6) Authorisation airside of vehicle drivers (Airside Driver Permit – ADP)

MEDICAL REQUIREMENTS

(a) The aerodrome operator should implement medical standards as part of the criteria for holding an ADP. As a minimum the medical requirements should require the items listed below:

(1) an initial and renewal medical declaration to include eyesight, colour perception.

(2) medical assessments to relate to occupational age limits; and

(3) the requirement for a review following a driving accident or incident at work.

(b) Renewal and Monitoring

Airside driver's health standard should be monitored within the period specified by the aerodrome operator or in accordance to the employees own company policy, and where necessary, examinations should be carried out by suitably qualified staff.

GM1 ADR.OPS.B.024(a)(6) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

MEDICAL REQUIREMENTS

(a) It is the responsibility of the aerodrome operator to decide what additional specific factors there might be about the workplace and vehicles which may impose additional medical fitness requirements over and above those required for driving on the public roads. This should be based on a local risk assessment by the aerodrome operator, which may include organisations that operate airside, and should relate to local procedures, environment, infrastructure, topography, and the complexity of the aerodrome and aircraft operations.

(b) A driver should be required to disclose to the aerodrome operator and their employer, any existing or new medical condition or prescribed medication which may affect their ability to drive safely. Where a health professional places a condition or restriction on a driver, this should be declared to and considered by the employer and medical advice obtained. The employer should inform the aerodrome operator of any such condition or restriction who should take appropriate action which may involve the suspension or removal of the ADP.

AMC1 ADR.OPS.B.024(b) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

VALIDITY AND REVALIDATION REQUIREMENTS

(a) Revalidation requirements

Aerodrome operators should ensure that drivers continue to hold the correct categories of licence for the public roads at all times.

(b) The aerodrome operator should establish a system ensuring that drivers maintain competence in their driving rules, duties and procedures in those areas where they are permitted to drive.

(c) ADP validity and renewal

(i) Duration: up to two years; and

(ii) Renewal: competence should be maintained. This may be confirmed/assessed by a

maintenance of competency scheme or refresher training, but in either case, must include appropriate assessments.

(d) In order for the ADP to be renewed :

Apart from the requirements of (c) (ii) the driver holds a current and valid UAE licence .

(e) Records of training and assessments should be retained. Third party trainers/assessors must ensure that records are available for audit by the aerodrome operator.

AMC2 ADR.OPS.B.024(b) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

CESSATION OF DRIVING AUTHORISATION

The aerodrome operator should set out the circumstances under which a permit will cease to be a valid and must be surrendered for cancellation. Such circumstances should include:

(a) cessation of the purpose for which the permit was issued;

(b) change of the holder's employer;

(c) loss of driving license for offences under the UAE's road traffic regulations;

(d) any defacing, alteration, or misuse of a permit;

(e) proof of disregard of aerodrome traffic rules; and

(f) any use of a permit in relation to a customs or immigration offence.

AMC4 ADR.OPS.B.024(c) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

TRAINING OF DRIVERS - RADIOTELEPHONY

In addition to the requirements of CAR AGA, Part-TRG, drivers who are expected to operate on the manoeuvring area of the aerodrome should also receive training in Radiotelephony , which should include as a minimum:

(a) hierarchy of message priority :message priorities, and understanding of distress, alerting, control and information messages.

(b) phonetic alphabet: correct pronunciation of letters, words, and numbers.

(c) standard phraseology

(1) emphasis on the need for drivers to use standard phraseology; and

(2) the need for caution with certain phrases such as ‘cleared’.

(d) call signs for aircraft, ATC, and vehicles

(1) an understanding of terminology and acronyms used by ATC and pilots;

(2) knowledge of the airline call signs used at the aerodrome; and

(3) knowledge of vehicle call signs, and that they should be appropriate to their function.

(e) read back procedures : The need for vehicle drivers to use standard readback, in the same manner as pilots, for instructions such as ‘enter/cross the runway’, and if conditional clearances are used.

(f) readability scale: Understanding and use of the readability scale from 1 to 5.

(g) lost or uncertain of position: Understanding of local procedures for vehicle drivers are lost or uncertain of their position on the manoeuvring area.

(h) vehicle breakdown

(1) local procedure for vehicle breakdown on runways and taxiways; and

(2) procedure for notifying ATC of vehicle failure.

(i) radio failure

(1) understanding of the local procedure if radio failure occurs while on the runway or taxiway; and

(2) understanding of the light signals that can be used by ATC to pass instructions to vehicles.

(j) transmitting techniques and use of RTF

(1) understanding the reasons for listening out prior to transmitting;

(2) use of standard phraseology and ICAO air-ground radiotelephony communications procedures;

(3) words and sounds to be avoided;

(4) correct positioning of microphones to avoid voice distortion;

(5) avoidance of 'clipped' transmissions;

(6) awareness of regional accents and variations of speech; and

(7) speed of delivery of RTF phraseology.

(k) portable radios

(1) correct use of radios;

(2) effective range and battery life;

(3) screening/shielding effects on the aerodrome; and

(4) use of correct call signs, either related to a vehicle or a person.

(l) safety while using radios

(1) local instructions regarding the use of portable radios and hand-held microphones while driving a vehicle; and

(2) local instructions on the use of mobile telephones while operating airside.

AMC5 ADR.OPS.B.024(c) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

PRACTICAL TRAINING- RADIO TELEPHONY

In this phase, the training should cover the use of fixed and portable radio communication devices, and the practical use of the theoretical knowledge acquired in the previous phase of the training, through the implementation of the aerodrome's communication procedures.

GM1 ADR.OPS.B.024(c) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

TRAINING OF DRIVERS — GENERAL

(a) Generally, operations at an aerodrome are dependent on air traffic controllers, pilots and vehicle drivers using visual observations to estimate the respective relative position of aircraft and vehicles. Pilots and vehicle drivers rely on visual aids (lighting, markings and signage) to guide them along their assigned routes and to identify intersections and holding positions. As part of the Surface Movement Guidance and Control System (SMGCS) the aerodrome operator should establish and train aerodrome users on the characteristics and meaning of the standardized markings , lights and signage implemented at the aerodrome. These should include, but are not limited to:

(1) Markings

(i) Boundary of responsibility line

(ii) Stand safety line

(iii) Stand-by areas – restricted for aircraft manoeuvres

(iv) Stand-by areas – height restricted

(v) Stand divide line

(vi) Tractor pushback line and pushback limit line

(vii) Equipment staging area

(viii) Air bridge wheel position

(ix) Underground services including fuel hydrant markings

(x) Service road

(xi) Vehicle limit line

(xii) Stand identification on service road

(xiii) Taxiway and taxilane crossing

(xiv) Pedestrian crossing

(xv) Pedestrian guide line

(2) Apron Signs

(i) Stand identification sign for aircraft

(ii) No-entry sign for aircraft

(iii) Sign attention to crossing aircraft for vehicles

(iv) Jet blast sign for vehicles

(v) Examples of road and other traffic signs

(vi) Examples of emergency signs

(vii) FOD Bin

(b) The theoretical training should be supported by material which provides up-to-date, adequate and suitable information regarding the aerodrome, in the form of presentations, maps, diagrams, videos, booklets, checklists, etc. as appropriate

GM2 ADR.OPS. B.024(c) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

RECURRENT, REFRESHER AND CONTINUATION TRAINING

CAR AGA, Part – TRG requires the provision of training following the completion of the initial training, as part of the aerodrome operator's training programme.

AMC1 ADR.OPS.B.024(d) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

AERODROME OPERATING AREAS

The Aerodrome Operator should separate the airside area into distinct operating areas, each operating area requiring a separate category of ADP.

GM1 ADR.OPS.B.024(d) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

AERODROME OPERATING AREAS FOR ADP

(a) The Aerodrome Operator should separate the airside area into distinct operating areas, each operating area requiring a separate category of authorisation. It is recommended that the airside is split into a minimum of 2 areas, the first area comprising the airside road system and aprons, while the second area consists of the taxiways and runways (the manoeuvring area).

(b) Depending on the complexity of the aerodrome, the manoeuvring area may be further split into that area excluding the runways, and that area including the runways.

GM2 ADR.OPS.B.024(d) Authorisation of vehicle drivers (Airside Driver Permit – ADP)

(a) A separate ADP Category may be issued for each of the operating areas established with the recommended ADP categories as follows:

(1) 'Airside Roads and Aprons'

The airside roads and apron permits are the initial permit awarded to a new driver who has successfully completed a local training course and assessment. The permit allows a driver to operate on airside roads and aprons, which may include controlled and uncontrolled taxiway crossings. The awarding of the permit allows the holder to progress their training to operate on the manoeuvring area, excluding runways.

(2) 'Manoeuvring Area excluding Runways'

The manoeuvring area (excluding runways) permit allows a driver to operate on the manoeuvring area but excludes operation on the runway. It is a pre-requisite for the candidate to successfully complete a radiotelephony course, prior to obtaining this permit. The holder of the permit should maintain competence in RTF throughout the validity period of the permit. RTF competence checks should be completed by persons approved by the aerodrome operator: this may be a training provider, their employer or the aerodrome operator itself.

(3) 'Manoeuvring Area including the Runway'

The manoeuvring area (including runways) permit allows a driver to operate on runway(s) once the RTF training course is successfully completed.

Where only a single ADP category is required for operating on the manoeuvring area, the training and assessments should be based on requirements of CAR AGA, Part- TRG .

(b) If the Aerodrome Operator permits free ranging on the manoeuvring area, the authorizations and scope needs to be defined and be part of the ADP licensing and training scheme. Any assessment or consideration to 'free ranging' should be documented through the LRST and be coordinated with aerodrome control tower. It should be made very clear, if 'free ranging' exists that at no time does this allow the entry onto a runway without aerodrome control tower authorization.

AMC1 ADR.OPS.B.024(e) Authorisation of vehicle drivers (Airside Driver Permit – ADP)

TEMPORARILY PERMITTING THE DRIVING OF VEHICLES

(a) When permitting temporarily the driving of a vehicle, the period for which the permit is valid and the areas in which the driver will be allowed to operate under escort should be specified.

(b) The escort of a vehicle whose driver has been issued a temporary driving permit should only be performed by the aerodrome operator or any other driver(s) authorised for this purpose.

GM1 ADR.OPS.B.024(e) Authorisation of vehicle drivers (Airside Driver Permit – ADP)

TEMPORARILY PERMITTING THE DRIVING OF VEHICLES

(a) ADR.OPS.B.024 in general addresses the case of authorisation of drivers whose nature of work and activities involves regular presence and driving within the aerodrome environment.

(b) However, there are cases where it may be necessary to temporarily allow the driving of a vehicle on the movement area or other operational areas of the aerodrome for other reasons (e.g. a contractor's vehicle that needs to enter the movement area for maintenance activities taking place at the aerodrome, etc.).

(c) In cases where the driving on the movement area or other operational areas is necessary but for a limited period of time, the aerodrome operator may permit such driving without requiring the driver to undergo the process for the issuance of an authorisation for the driving of this vehicle. It is expected, however, that before being permitted to operate in such areas, such drivers will be adequately briefed about their obligations while operating within the aerodrome perimeter, and

that the aerodrome operator has developed procedures to be implemented during this type of operations.

(d) In any case, the issuance of such a permit for such a driver does not waive the obligation of the aerodrome operator to ensure:

(1) the condition of the vehicle that this driver may be temporarily driving into the aerodrome area, in accordance with ADR.OPS.B.024.

(2) that this vehicle will in any case be escorted; and

(3) that the operation of this vehicle on the manoeuvring area is subject to the applicable provisions of ADR.OPS.B.025 and ADR.OPS. B.026.

AMC1 ADR.OPS.B.024(f) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

PROCEDURES FOR ISSUANCE OF DRIVING AUTHORISATIONS(ADP) AND TEMPORARILY PERMITTING DRIVING OF VEHICLES, AND RELEVANT MONITORING ACTIVITIES

(a) The aerodrome operator should clearly identify responsibilities for:

(1) issuing driving authorisations and temporary driving permits;

(2) ensuring that the prerequisites for maintaining a driving authorisation valid continue to be met;

(3) monitoring the compliance of the drivers with the driving rules applicable at the aerodrome, and taking appropriate action as the case may be. Such actions should include the possibility of suspension or revocation of the ADP or of temporary driving permit.

(b) Issuing such authorisations, temporarily permitting the driving of vehicles and ensuring that the prerequisites for maintaining a driving authorisation should be a controlled activity.

(c) Irrespective of the organisational set-up chosen, it should be ensured that information regarding drivers who:

(1) do not continue to meet the requirements for maintaining the validity of the relevant driving authorisation; or

(2) violate the driving requirements,

is forwarded to the aerodrome unit(s) responsible for the issuance/revocation of the driving authorisations, in a timely manner, to take appropriate action depending on the case.

(d) The established procedures should clearly indicate how cases of violations of the applicable driving requirements at the aerodrome are dealt with. They should especially take into account the seriousness of each violation and also address cases of repeated violations of the applicable driving requirements. The cases where a driver should be required to undergo additional training should also be addressed in the procedures.

AMC2 ADR.OPS.B.024(f) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

RECORD KEEPING

(a) Records of training and assessments for the airside driving permits should be retained. Third-party trainers/assessors must ensure that records are available for audit by the aerodrome operator.

(b) A suitable means should be provided for the secure storage of information relating to ADPs.

GM1 ADR.OPS.B.024(f) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

The information should include:

(a) identification number;

(b) name;

(c) date of birth;

(d) employer;

(e) name of training organization;

(f) name of trainer;

(g) date of completion of training;

(h) date of validation;

(i) assessment results;

(j) date of renewal

(k) infringement notices;

(l) type of permit held;

(m) driving history (accidents/incidents);

(n) UAE licence checks;

(o) any required medical evidence; and

(p) copies of self-declarations of fitness or approved declarations by an occupational health practitioner.

The information described above may be kept as required in ADR.OR.G.035 – Record keeping.

GM1 ADR.OPS.B.024(f)(2) Authorisation of airside vehicle drivers (Airside Driver Permit – ADP)

DRIVING AUTHORISATION FORMAT

There are various solutions for issuing an ADP. A combination of the driving authorisation with the badge issued to personnel or the issuance of a separate card are some of the possible solutions. In any case, it is important that the privileges of the holder are clearly contained in the authorisation.

ADR.OPS.B.025 Airside Driving Rules

(a) Aerodrome operators shall

(1) establish and implement airside driving rules;

(2) ensure all airside drivers are made aware of the rules;

(3) monitor that the driving rules are always adhered to.

(b) The driver of a vehicle on the Movement Area shall comply with all mandatory instructions and information conveyed by aerodrome visual aids .

(c) The Aerodrome Operator shall ensure that the movement of vehicles on the movement area is safely managed.

(d) The aerodrome operator shall include rules and procedures to manage driving behaviour.

AMC1 ADR.OPS.B.025(a) Airside Driving Rules

Airside driving rules should include the following requirements, as a minimum:

(a) speed limits;

(b) right of way;

(c) driving routes;

(d) vehicle condition requirements;

(e) use of vehicle lights;

(f) low visibility procedures;

(g) signs, markings, lights;

(h) apron boundary line

(i) procedures for the entry to/exit from the apron areas in which aircraft and vehicle movements are combined;

(j) Service roads – Head of stand, back of stand, inter stand roads inside tunnels (where applicable);

(k) Taxiway crossings;

(l) No parking area;

(m) Equipment staging area;

(n) Fuel hydrant pits and other underground service pits;

(o) Passenger boarding bridge – Safety area;

(p) Equipment restraint area;

(q) Pedestrian crossings;

(r) Safe distance from taxing aircraft;

(s) Vehicle refuelling;

(t) Vehicle height limits in the airside;

(u) Use of seat belts;

(v) Transport of passengers

AMC2 ADR.OPS.B.025(a) Airside Driving Rules

RIGHT OF WAY

(a) An emergency vehicle responding to an emergency should be given priority over all other surface movement traffic.

(b) A vehicle operating on an apron should give way to:

(1) an aircraft taxiing, about to taxi, or being pushed or towed;

(2) to other vehicles in accordance with local airport regulations.

GM1 ADR.OPS.B.025 Airside Driving Rules

Airside driving rules should include details such as:

(a) Speed

Aerodrome Operators must establish speed limits based on their assessment of various factors, including road conditions, proximity to aircraft, type of vehicle / equipment expected to use the road etc., The driver of a vehicle should follow strictly all speed limits, indicted by road signs and markings.

(b) Service road

(1) Primary service roads (also known as inner GSE roads)

these are roads normally located front of aircraft parking stands and are meant for the movement of vehicles and equipment to individual aircraft stands without having to proceed on apron areas.

(2) Secondary service roads (also known as outer GSE roads)

(i) these roadways are normally located behind aircraft parking stands between the aircraft stand and the aircraft stand taxilane, and are usually painted with two solid white lines on the road edge that is nearer to the taxilane / taxiway.

(ii) drivers should maintain the correct speed and look out and give way to all taxing aircraft and aircraft moving onto or off a stand or being towed.

(iii) when an aircraft is approaching, the driver should immediately take evasive action. The driver should visually check that the area is clear of aircraft movement before proceeding.

(iv) A driver should not use secondary service road as a short cut or to overtake.

(3) Perimeter service roads

these are roadways normally located near the fence surrounding the airport boundary and away from the apron areas.

(c) Service roads crossing taxiways

(1) where service roads cross taxiways the driver should keep a constant look out and give way to aircraft at all times.

(2) drivers are required to adhere to any safety instructions when approaching a taxiway for crossing it. It is common to see a “Give Way to Aircraft” sign or marking warning drivers of taxiway crossing ahead and potential aircraft movement. Drivers should stop at the “STOP” marking and visually check that the area is clear of aircraft movement before moving onto the crossing.

(3) if there are light signals at the service road crossing, driver should check that the signals indicate that it is clear to proceed. The driver should still visually check that the area is clear of aircraft movement before proceeding.

(4) to prevent obstruction to aircraft movement, the driver should not stop on any part of the crossing.

(d) Apron boundary line

the apron boundary line indicates the boundary between the aircraft stand and the secondary service roads. Represented by a double white or yellow line, crossing this line requires permission from ATC and a driving permit authorising to diver in that area.

(e) Fuel hydrant pits

fuel hydrant pits are usually demarcated with a red box or circle. Drivers should not drive or park over fuel hydrant pits.

(f) Passenger Boarding Bridge (PBB) safety area

Safety area is usually indicated by a red hatched area and this area should be kept clear of any movements at all the time for the safe operations of the PBB. Vehicles and equipment are not permitted to enter and/or park within the PLB safety area at any time. All drivers should alert the PLB operator if anything is obstructing the safety area before PBB operations begin.

(g) Equipment restraint area

the Equipment Restraint Area is demarcated by a solid red and white line. The Equipment Restraint Area of an aircraft stand to be kept clear for the safe movement of an aircraft operating in and out of the stand. Drivers should not park or position any vehicle or ground Servicing equipment within the Equipment Restraint Area at all times, unless they are servicing an aircraft after its arrival or prior to its departure of the aircraft.

(h) Pedestrian crossings

all Drivers should look out for pedestrian crossing signs and slow down when approaching a crossing and be prepared to stop and give way to pedestrians.

(i) Safe distance from Aircraft

The Aerodrome Operator in coordination with the respective ground handlers/airlines should define minimum safety distances to be kept during the servicing of an aircraft.

(j) Safe distance from taxing aircraft

No driver should cross the movement area in front of the path of a taxing aircraft or an aircraft on tow or pushback. A driver should remain vigilant to the hazards of jet blast and a safety distance, as defined by the aerodrome operator, should be maintained behind a taxing aircraft.

(k) Driving Equipment

All drivers should be authorised and trained to operate the specific type and kind of equipment such as forklifts, boom lifts and scissor lifts as applicable. Pre-start checks should be conducted prior to operating the equipment to ensure it is fully operational. While driving, the driver should watch out for any height limit surrounding structures and when approaching any blind area, the driver should drive with caution.

(l) Driving Inside Aircraft Parking Stand

(1) drivers should not enter or park in an aircraft parking stand unless they are required for ground operations of the aircraft and possess an AVP/ADP with access to aircraft stand.

(2) while waiting in the Equipment Staging Area to service an arriving aircraft, drivers should park their vehicle with the handbrake engaged. When aircraft are entering the aircraft stand, the driver should stay clear of the Equipment Restraint Area and may only enter the Equipment Restraint Area after the aircraft chocks have been positioned and if it is safe to do so.

(3) a marshaller should assist the driver while reversing towards the aircraft.

(4) drivers should not drive or park under the wing or fuselage of an aircraft unless the vehicle is engaged in refuelling and maintenance service.

(5) during pushback, the driver of other vehicles should again stay clear of the Equipment Restraint Area to ensure the safe movement of the aircraft.

(m) Vehicle refuelling

(1) vehicle refuelling should only carried out at dedicated vehicle refuelling locations declared by the aerodrome operator.

(2) to avoid vehicle breakdowns in operationally critical areas, drivers should complete a vehicle serviceability check prior to using the vehicle which should include a fuel level check.

(3) in the event that a vehicle does run out of fuel, the vehicle should be immediately towed to a designated location for refuelling.

(4) in the event of a fuel spillage the driver should follow airport reporting and cleaning procedures immediately.

(n) Vehicle height limits in the airside

a driver driving /operating/ towing tall equipment should take note of any overhanging building structures and height limit signs displayed and not use roads with a height limit lower than that of the equipment under tow.

(o) Use of seat belts

all vehicles should be installed with seat belts for the driver and, if applicable, passengers. All drivers and passengers should wear their seat belts while the vehicle is in motion.

GM2 ADR.OPS.B.025 Airside Driving Rules

DRIVING DURING LOW VISIBILITY

(a) During Low Visibility Conditions the aerodrome operator is required to ensure that persons and vehicles operating on the movement area are restricted to the essential minimum.

(b) Aerodrome Operators should put in place specific training and authorisations for those drivers that may be required to operate on the manoeuvring area during Low Visibility conditions.

(c) All non-essential traffic should remain off the aprons until the low visibility conditions have cleared and have been officially terminated unless necessary for the imminent movement/servicing of an aircraft.

(d) Unless absolutely necessary, drivers should be required to stay on the service roads and not drive between stands or behind aircraft and all movement from one stand to another should be restricted to the service roads.

(e) Vehicles operating airside during low visibility should display, as a minimum, head lights and the flashing beacon.

(f) Speed limits on the service roads should be reduced and drivers required to take all precautions.

GM3 ADR.OPS.B.025 Airside Driving Rules

GENERAL DRIVING CONDUCT

Aerodrome operator's general driving conduct should include the following requirements also:

(a) drivers should be required to carry their ADP at all times while operating on airside and be required to show it upon request from the Aerodrome Operator.

(b) no person under the influence of alcohol; medicine or drugs should be permitted to operate a vehicle or equipment at airside.

(c) no driver or passenger should consume any form of food while on airside.

(d) smoking should be strictly prohibited airside.

(e) use of mobile phone while driving airside should be prohibited. Where it is necessary to communicate using a mobile phone, i.e. where there is a communication failure with ATC or essential communication with the aerodrome operator or the driver's company is required, the driver should park the vehicle in an area that is safe from aircraft movements.

(f) never drive or walk in front of or behind an aircraft with its engine is running.

(g) never drive or park under aircraft wings unless involved in aircraft servicing.

(h) never leave vehicle unattended with the engine running.

(i) never reverse vehicle near an aircraft without a marshaller.

(j) never park equipment so that other vehicles are obstructed.

(k) never park within the fuel zone during the refuelling process unless involved in refuelling activity.

(l) never work close to the filling or ventilation openings of the aircraft fuel tanks during refuelling.

(m) report all fuel, oil and other chemical spillages.

(n) keep the movement area clean of FOD.

GM3 ADR.OPS.B.025 Airside Driving Rules

MANOEUVRING AREA AND RADIOTELEPHONY

The movement of vehicles on the manoeuvring area is generally subject to authorization by aerodrome control tower. Depending on the complexity of the aerodrome, aerodrome control tower may operate a number of radio frequencies. Typically, in these cases, the aerodrome ground controller will be responsible for all vehicles operating on the taxiways, and the air controller will be responsible for all vehicles wishing to enter or cross the runway(s). It is essential that all vehicles required to be under positive control on the manoeuvring area are equipped with the appropriate radio communication devices tuned to the appropriate frequencies.

GM1 ADR.OPS.B.025(d) Airside Driving Rules

Consideration should be given by aerodrome operators to adopt a scheme such as recording 'offences' and possibly penalties in order to measure the level of poor behaviour or standards, and to identify where mitigation measures may be required. Considerations for an offence system to be included in the ADP scheme are:

(a) reference to by-laws, rules and penalties;

(b) who can issue warnings or infringement notices;

(c) infringement offences;

(d) sanctions and penalties, including those for serious or repeat offences;

(e) notification of infringements to the driver and employer;

(f) use of a points system and/or fines system;

(g) time limits for offences or points;

(h) appeal procedures.

ADR.OPS.B.026 Authorisation of airside vehicles

(a) The operation of vehicles on the movement area or other operational areas shall require authorisation issued by the Aerodrome Operator(Airside vehicle Permit – AVP). The authorisation may be issued if the vehicle is used in activities related to the operation of the aerodrome, have a justifiable reason to be on airside, and:

(1) is serviceable and fit for the intended operation;

(2) complies with the marking and lighting requirements of point ADR.OPS.B.080- Marking and lighting of vehicle and other mobile objects;

(3) is equipped with a radio allowing two-way communication on the appropriate air traffic services frequency and any other frequency necessary, if it is intended to be operated on either of the following areas:

(i) the manoeuvring area;

(ii) other operational areas where communication with the air traffic services unit or other operational units of the aerodrome is necessary;

(4) is fitted with a transponder or other equipment that supports surveillance, if it is intended to be operated on the manoeuvring area, and the aerodrome is equipped with a surface movement guidance and control system whose operation requires the use of a transponder or other equipment supporting surveillance fitted on the vehicles.

(b) The aerodrome operator shall:

(1) establish and communicate to stake holders the processes and procedures for the application of an Airside Vehicle Permit (AVP) and;

(2) limit the number of vehicles authorised to operate on the movement area and other operational areas to the minimum number required for the safe and efficient operation of the aerodrome.

(c) An authorisation issued in accordance with point (a) shall:

(1) specify the parts of movement area or other operational areas where the vehicle may be operated;

(2) remain valid as long as the requirements of point (a) are met.

(d) The aerodrome operator shall assign a call sign to a vehicle authorised in accordance with point (a) to operate at the aerodrome, if that vehicle is required to be radio-equipped. The call sign assigned to a vehicle shall:

(1) not cause confusion regarding its identity;

(2) be appropriate to its function;

(3) for vehicles that operate in the manoeuvring area, be coordinated with the air traffic services unit, and disseminated to the relevant organisations at the aerodrome.

(e) By derogation from point (a), the aerodrome operator may permit:

(1) a vehicle authorised to operate in the airside where it is needed to be equipped with a radio equipment and a transponder in accordance with point (a)(3) point (a)(4), to be occasionally operated in the areas referred to in points (a)(3) and (a)(4), provided:

(i) that vehicle is escorted, at all times, by an authorised vehicle meeting the requirement of point (a)(3) and, if necessary, point (a)(4);

(ii) the escorting vehicle complies with the marking and lighting requirements of ADR.OPS.B.080 - Marking and lighting of vehicle and other mobile objects;

(iii) low-visibility procedures are not in effect, if the escorted vehicle is to be operated in the manoeuvring area;

(2) the temporary entry of a vehicle to the aerodrome and its operation on the movement area or other operational areas, are subject to the following conditions:

(i) a visual inspection of that vehicle determines that its condition does not endanger safety;

(ii) that the vehicle is escorted, at all times, by an authorised vehicle which:

1) meets the requirement of point (a)(3) and, if necessary, point (a)(4), when operating in the areas referred to in points (a)(3) and (a)(4);

2) complies with the marking and lighting requirements of point ADR.OPS.B.080 - Marking and lighting of vehicle and other mobile objects;

(iii) low-visibility procedures are not in effect, if the vehicle is to be operated in the manoeuvring area.

(f) The aerodrome operator shall:

(1) establish and implement procedures for:

(i) issuing vehicle authorisations and temporary permitting the entry to the aerodrome and operation of vehicles;

(ii) assigning call signs to vehicles;

(iii) monitoring the compliance of vehicles with the requirements of ADR.OPS.B.026 - Authorisation of airside vehicles and for taking appropriate action, including the suspension and revocation of vehicle authorisations or permissions to temporarily operate a vehicle;

(2) maintain relevant records.

AMC1 ADR.OPS.B.026 Authorisation of airside vehicles

EQUIPAGE OF VEHICLES - GENERAL

(a) An updated copy of the movement area chart of sufficient size, including hot spots, as well the visual aids configuration on the aerodrome, and areas to be safeguarded, should be readily available in the vehicle intended to be operated in the manoeuvring area. If a vehicle is not to be operated in the manoeuvring area, the copy of the chart may be customised to provide only relevant information of

the area in which the vehicle is to be operated, along with information of the adjacent areas, to improve the situational awareness of the driver.

(b) The aerodrome operator, in coordination with the air traffic services provider and the apron management services provider (where applicable), should assess in which areas of the aerodrome a vehicle needs to be equipped with a radio ,apart from the manoeuvring area.

The radio with which the vehicle is equipped should allow two-way communication with the air traffic services unit frequency, and any other unit that the driver of the vehicle may need to establish contact with.

Updated information regarding the frequencies of each unit should be readily available in the driver's cabin, as well as the frequencies that may need to be used at different areas of the aerodrome. Moreover, the call-sign of the vehicle should be displayed at a prominent place.

AMC2 ADR.OPS.B.026(a)(1) Authorisation of vehicles

VEHICLE'S FITNESS TO USE IN THE AIRSIDE

(a) The applicant or employer applying for an Airside Vehicle Permit should be responsible for the safe operation and condition of the vehicle / equipment used airside and should be required to certify:

(1) that the vehicle/equipment for which an Airside Vehicle Permit has been issued is, on a regular basis, properly inspected, maintained and serviced by an appropriately qualified person;

(2) the applicant or employer should be required to retain inspection and maintenance records and make them available to the airport operator upon request.

(b) The vehicle's fuel and hydraulic systems should be free of leaks.

(c) Ensure systems are in place to prevent fire including the following:

(i) regular vehicle maintenance and daily checks, especially for older vehicle;

(ii) fire extinguisher is available in the vehicle at all times;

(iii) vehicle/equipment engine are be switched off before leaving the vehicle;

(iv) checking the vehicle for leakage of fluid before starting the engine.

GM1 ADR.OPS.B.026(b)(2) Authorisation of vehicles

LIMITING THE NUMBER OF VEHICLES

(a) The aerodrome operator should limit vehicular activity to what is necessary, in order to ensure the safety of operations, but also taking into account the need to ensure the proper and smooth functioning of the aerodrome.

(b) In this respect, vehicle use may be limited to those vehicles which are necessary to support the ground servicing and handling of aircraft cargo/mail and passengers, aerodrome maintenance and operations, including aerodrome emergency services, aerodrome security services, and State authorities' vehicles.

(c) Vehicles on the manoeuvring area should be limited to those absolutely necessary, especially on the runway. Vehicles allowed to operate on the runway should include only those necessary for operational activities such as inspections and maintenance, and emergency vehicles. It is strongly advised not to increase runway use by other vehicles such as those involved in ground operations, e.g. aircraft towing, etc. unless there is no alternative route.

AMC1 ADR.OPS. B.026(c)(1) Authorisation of airside vehicles

DISPLAY OF VEHICLE AUTHORISATION

A vehicle authorisation should be displayed at a prominent place on the vehicle, in a position that minimizes obstruction to the driver's view while driving.

GM1 ADR.OPS.B.026(c)(1) Authorisation of airside vehicles

AIRSIDE VEHICLE PERMIT

(a) Vehicles required to access the airside should be controlled by aerodrome operator through the use of an Airside Vehicle Permit (AVP) scheme and all vehicles should display an AVP whilst airside. Exceptions may be made for visiting vehicles performing maintenance or other services but these vehicles should be escorted by a holder of an ADP.

(b) An AVP does not confer the right of entry and does not identify the driver or passengers. An AVP serves to identify the vehicle and is an acknowledgment by the aerodrome operator that the vehicle is permitted to be used in the controlled or restricted areas specified on the permit when on official use.

(c) Depending on the number of vehicles and the complexity of the aerodrome, the use of colour-coded vehicle authorisations is a solution that may be considered, to facilitate the control of the vehicles.

GM2 ADR.OPS.B.026(c)(1) Authorisation of vehicles

TEMPORARILY PERMITTING VEHICLE OPERATION

Vehicles may be authorised only if they are used in activities related to the operation of the aerodrome. However, from time to time, and for various reasons, it may be necessary to allow a vehicle to enter the aerodrome area and to be operated on the movement area or other operational areas, for a limited period of time (e.g. transportation of supplies, maintenance activities, transportation of patients, etc.). In such cases, the aerodrome operator may issue a temporary permit for the entry of the vehicle into the aerodrome and its operation in the area necessary.

In such situations, a visual inspection of the vehicle is necessary, for obvious damages or malfunctions of the vehicle (e.g. leakages, braking system, condition of tyres, lights, etc.) to determine the serviceability of the vehicle.

Temporary Airside Vehicle Permit should be valid for a specific period of time for a specific vehicle. A temporary AVP should be issued to vehicles that require short term access to perform a specific task, such as contractors delivering construction material.

AMC2 ADR.OPS.B.026(c) Authorisation of vehicles

CONDITION FOR ISSUE OF VEHICLE AUTHORISATION

(a) The following conditions should apply when issuing an Airside Vehicle Permit:

(1) a permit should be subject to a signed declaration by the applicant, indicating that the details provided are accurate.

(2) the permit should be issued to a specific vehicle.

(3) the Airside Vehicle Permit should be non-transferable between vehicles, companies or persons and serve only to identify the vehicle, not the driver or passengers within.

(4) the vehicle should have a current UAE vehicle registration (if applicable) with valid and airside specific insurance clause coverage as required by the aerodrome operator.

(5) the applicant should be responsible for returning an Airside Vehicle Permit to the relevant airport department management for cancelations in the following circumstances:

(i) when the purpose for which the pass was issued has ceased; and

(ii) when the vehicle ownership changes or when the vehicle permanently ceases operation airside.

GM1 ADR.OPS.B.026(d) Authorisation of vehicles

VEHICLE CALL SIGNS

(a) The use of similar call signs may lead to call sign confusion, which is one of the factors associated with runway incursions. To avoid call sign confusion, when assigning a call sign to a vehicle, careful consideration needs to be given to the call signs used by aircraft operating at the aerodrome, as well as the call signs of other vehicles.

(b) Ways to reduce the possibility of call sign confusion include:

(1) use of call signs which are appropriate to the function of the vehicle (e.g. 'Operations', 'Fire'). Where more than one vehicle is used in the same function, then a numbering policy may be used, such that the call sign is followed by a number, e.g. 'Operations 1'.

(2) use of unique numbers or identification call signs for each vehicle.

(c) At aerodromes where the number of vehicles and the aircraft traffic is high, before assigning a call sign to a vehicle, it is recommended that the aerodrome operator, apart from the coordination with the air traffic services provider, consults also the other organisations operating vehicles at the aerodrome. As soon as a call sign is assigned to a vehicle, this needs to be known to at least the air traffic services provider.

AMC1 ADR.OPS.B.026(e) Authorisation of vehicles

ESCORTING OF VEHICLES

The escorting of a vehicle should only be performed by person duly authorised to drive in the airside and for this purpose. The aerodrome operator should establish procedures for the escorting of vehicles, which as a minimum should contain:

(a) minimum visibility conditions when escorting of a vehicle may be performed on the manoeuvring area;

(b) communication means and procedures between the escorting and the escorted vehicle(s);

(c) escorting procedures when more than one vehicle is to be escorted;

(d) procedures for ensuring that drivers of the escorted vehicles comply with the instructions provided by the air traffic services unit.

(e) the procedures should be coordinated with the air traffic services unit.

GM1 ADR.OPS.B.026(e) Authorisation of vehicles

OCCASIONAL OPERATION OF AUTHORISED VEHICLES WITHOUT RADIO, TRANSPONDER OR OTHER MEANS SUPPORTING SURVEILLANCE

(a) The aerodrome operator may decide to permit the occasional operation of vehicles, which have been authorised to be operated on the aerodrome but which are not equipped with a radio, in areas where vehicles are required, by ADR.OPS. B.026 (a)(3). The same applies with regard to authorised vehicles, which are not equipped with a transponder or other equipment supporting surveillance as foreseen in ADR.OPS. B.026 (a)(4).

(b) Characteristics of escorting vehicles

A vehicle mentioned in points (a) above, needs to be escorted by a vehicle equipped with a radio, in accordance with ADR.OPS. B.026 (e)(1)(i) or ADR.OPS. B.026 (e)(2)(ii) Authorisation of airside vehicles, if it is to be operated:

(1) on the manoeuvring area; or

(2) in other areas where vehicles are required to be equipped with a radio (see also point (b) of AMC1 ADR.OPS. B.026(a)(1) ;(3)).

(3) In addition, If the escorted vehicle is to be operated on the manoeuvring area, the escorting vehicle would also need to be fitted with a transponder or other equipment supporting surveillance, if so required for the operation of the SMGCS of the aerodrome (see ADR.OPS. B.026(a)(4)).

(4) Moreover, the escorting vehicle needs to meet at all times the respective marking and lighting requirements for the area(s) where the escorted vehicle will be operating (see ADR.OPS.B.080).

(5) In this way, occasional unforeseen operational needs that may arise in the context of the operation of the aerodrome may be satisfied, given that such vehicles are not intended to be operated in such areas.

(c) Operational considerations

If the vehicle(s) mentioned in points (a) above are intended to be operated on the manoeuvring area, care is to be taken to ensure that this is done in compliance with ADR.OPS. B.026 (e)(1)(iii) Authorisation of airside vehicles or ADR.OPS. B.026 (e)(2)(iii), Authorisation of airside vehicles as the case may be, as well as the relevant procedures.

(d) Particular attention needs to be paid to the cases where two or more vehicles are temporarily entering the aerodrome, and especially the manoeuvring area, forming a convoy. In such cases, the escorting vehicles should be in positions that allow the monitoring of all escorted vehicles at all times, to ensure that all vehicles comply with the instructions of the air traffic services unit. In addition, attention is necessary to the ways and means that the communication between the escorting and the escorted vehicle will be taking place.

(e) In any case, temporarily permitting the use of the vehicle in accordance with ADR.OPS.B.026 (e)(2), or permitting the operation of an already authorised vehicle in accordance with ADR.OPS.B.026 (e)(1) does not waive the obligation of the aerodrome operator to ensure that the driver of the vehicle holds a permit to temporarily drive into the aerodrome area, or a driving authorisation as the case may be, in accordance with ADR.OPS.B.024- Authorisation of airside vehicle drivers.

AMC1 ADR.OPS.B.026(f) Authorisation of vehicles

PROCEDURES FOR ISSUANCE OF VEHICLE AUTHORISATIONS, TEMPORARILY PERMITTING THE OPERATION OF VEHICLES, ASSIGNING CALL SIGNS AND RELEVANT MONITORING ACTIVITIES

(a) The procedures should clearly identify responsibilities for:

(1) issuing vehicle authorisations, temporarily permitting the operation of a vehicle and assigning call signs to vehicles;

(2) ensuring that the prerequisites for maintaining a vehicle authorisation is valid continue to be met; and

(3) monitoring the compliance of vehicles with the relevant requirements, and taking of appropriate action depending on the case. Such actions should include the possibility of

suspension and revocation of a vehicle authorisation or a permission for the temporary operation of a vehicle.

(b) Issuing vehicle authorisations, temporarily permitting the operation of vehicles and ensuring that the prerequisites for maintaining a vehicle authorisation validity should be a controlled activity.

(c) Irrespective of the organisational set-up chosen to monitor the compliance of vehicles with the applicable requirements, a close cooperation should be established with the organisational unit(s):

(1) responsible for the implementation of the maintenance programme of its own vehicles (see ADR.OPS. C.007- Maintenance of vehicles); and

(2) monitoring the implementation of the maintenance programme of the vehicles of organisations operating or providing services at the aerodrome.

It should be ensured that information regarding vehicles which do not continue to meet the relevant requirements is forwarded to the responsible aerodrome unit(s) (if different) to take appropriate action.

(d) The established procedures should clearly indicate how cases of violations of the applicable requirements are dealt with, taking also into account the significance of each violation.

ADR.OPS.B.027 Operation of vehicles

(a) The driver of a vehicle on the manoeuvring area shall operate the vehicle in accordance with the following rules:

(1) emergency vehicles that proceed to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic;

(2) subject to the provisions of point (1):

(i) vehicles and vehicles towing aircraft shall give way to aircraft which are landing, taking off, or taxiing;

(ii) vehicles that do not tow aircraft shall give way to vehicles towing aircraft;

(iii) notwithstanding the provisions of points (i), (ii) vehicles and vehicles towing aircraft shall comply with the instructions issued by the air traffic services unit.

(b) The driver of a radio-equipped vehicle, intending to operate or operating on the manoeuvring area, shall:

(1) establish satisfactory two-way radio communication with the air traffic services unit on the appropriate air traffic services frequency before entering the manoeuvring area, and maintain a continuous listening watch on the assigned frequency;

(2) before entering the manoeuvring area, obtain authorisation from the air traffic services unit and shall operate only as authorised by the air traffic services unit.

(3) read back to the air traffic services personnel safety-related parts of the instructions which are transmitted by voice.

(c) The driver of a radio-equipped vehicle on the apron shall, if so required at the aerodrome:

(1) establish satisfactory two-way radio communication with the responsible unit designated by the aerodrome operator before entering the apron;

(2) maintain a continuous listening watch on the assigned frequency.

(d) The driver of a vehicle on the apron shall operate the vehicle in accordance with the following:

(1) only as authorised by the responsible unit designated by the aerodrome operator, and in accordance with the instructions issued by that unit;

(2) give way to an emergency vehicle, an aircraft taxiing, about to taxi, or being pushed or towed;

(3) give way to other vehicles in accordance with local regulations;

(e) The driver of a vehicle on the movement area and other operational areas shall:

(1) operate the vehicle in accordance with the established speed limits and driving routes;

(2) not be engaged in disturbing or distracting activities while driving;

(3) comply with the communication requirements and the operational procedures contained in the aerodrome manual.

(f) The driver of a vehicle escorting another vehicle shall ensure that the driver of the escorted vehicle operates the vehicle in accordance with the instructions given.

(g) The driver of a vehicle shall park the vehicle only in areas designated by the aerodrome operator.

(h) The aerodrome operator shall establish and implement procedures to ensure that drivers that operate on the movement area and other operational areas comply with points above.

AMC1 ADR.OPS.B.027(h)(2) Operation of vehicles

DISTURBING AND DISTRACTING ACTIVITIES WHILE DRIVING

When driving, a 'sterile-cab concept' should be implemented. In line with this, drivers should not be involved in non-essential activities that may affect their attention, situational awareness or judgement.

ADR.OPS.B.029 Language proficiency

(a) A person required under point ADR.OPS.B.024(a)(4) to demonstrate language proficiency, shall demonstrate proficiency, at least at an operational level both in the use of phraseologies and in plain language, in accordance with point (b), in English language;

(b) The applicant shall demonstrate the ability to:

(1) communicate effectively in voice-only and in face-to-face situations;

(2) communicate on common and work-related topics with accuracy and clarity;

(3) use appropriate communicative strategies to exchange messages and to recognise and resolve misunderstandings in a general or work-related context;

(4) handle successfully the linguistic challenges presented by a complication or unexpected turn of events which occurs within the context of a routine work situation or communicative task with which they are otherwise familiar;

(5) use a dialect or accent which is intelligible to the aeronautical community.

(c) Language proficiency shall be demonstrated by a certificate issued by the organisation that conducted the assessment.

(d) Except for persons who have demonstrated language proficiency at an expert level, the language proficiency shall be re-assessed every:

(1) four years from the date of the assessment, if the level demonstrated is operational level;

(2) six years from the date of the assessment, if the level demonstrated is extended level.

(e) The demonstration of language proficiency shall be done through a method of assessment, which shall contain:

(1) the process by which an assessment is done;

(2) the qualifications of the assessors conducting assessments of language proficiency.

AMC1 ADR.OPS.B.029 Language proficiency

RATING SCALE

The following table describes the different levels of language proficiency:

LEVEL	PRONUNCIATION Assumes a dialect or accent intelligible to the aeronautical community	STRUCTURE Relevant grammatical structures and sentence patterns are determined by language functions appropriate to the task	VOCABULARY	FLUENCY	COMPREHENSION	INTERACTIONS
Expert (Level 6)	Pronunciation, stress, rhythm, and intonation, though possibly influenced by the first language or regional variation, almost never interfere with ease of understanding.	Both basic and complex grammatical structures and sentence patterns are consistently well controlled.	Vocabulary range and accuracy are sufficient to communicate effectively on a wide variety of familiar and unfamiliar topics. Vocabulary is idiomatic, nuanced and sensitive to register.	Able to speak at length with a natural, effortless flow. Varies speech flow for stylistic effect, for example to emphasise a point. Uses appropriate discourse markers and connectors spontaneously.	Comprehension is consistently accurate in nearly all contexts and includes comprehension of linguistic and cultural subtleties.	Interacts with ease in nearly all situations. Is sensitive to verbal and non-verbal cues, and responds to them appropriately.
Extended (Level 5)	Pronunciation, stress, rhythm, and intonation, though influenced by the first language or regional variation, rarely interfere with ease of understanding.	Basic grammatical structures and sentence patterns are consistently well controlled. Complex structures are attempted but with errors which	Vocabulary range and accuracy are sufficient to communicate effectively on common, concrete, and work-related topics. Paraphrases	Able to speak at length with relative ease on familiar topics, but may not vary speech flow as a stylistic device. Can make use of appropriate discourse	Comprehension is accurate on common, concrete, and work-related topics and mostly accurate when the speaker is confronted with a linguistic or	Responses are immediate, appropriate, and informative. Manages the speaker or listener relationship effectively.

		sometimes interfere with meaning.	consistently and successfully. Vocabulary is sometimes idiomatic.	markers or connectors.	situational complication or an unexpected turn of events. Is able to comprehend a range of speech varieties (dialect or accent) or registers.	
Operational (Level 4)	Pronunciation, stress, rhythm, and intonation are influenced by the first language or regional variation but only sometimes interfere with ease of understanding.	Basic grammatical structures and sentence patterns are used creatively and are usually well controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.	Vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete, and work-related topics. Can often paraphrase successfully when lacking vocabulary particularly in unusual or unexpected circumstances.	Produces stretches of language at an appropriate tempo. There may be occasional losses of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers and connectors. Fillers are not distracting.	Comprehension is mostly accurate on common, concrete, and work-related topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication or an unexpected turn of events, comprehension may be slower or require clarification strategies.	Responses are usually immediate, appropriate, and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals adequately with apparent misunderstandings by checking, confirming, or clarifying.
Pre-operational (Level 3)	Pronunciation, stress, rhythm, and intonation are influenced by the first	Basic grammatical structures and sentence patterns	Vocabulary range and accuracy are often sufficient to	Produces stretches of language, but phrasing and pausing	Comprehension is often accurate on common, concrete,	Responses are sometimes immediate,

	language or regional variation and frequently interfere with ease of understanding.	associated with predictable situations are not always well controlled. Errors frequently interfere with meaning.	communicate effectively on common, concrete, and work-related topics but range is limited and the word choice often inappropriate. Is often unable to paraphrase successfully when lacking vocabulary.	are often inappropriate. Hesitations or slowness in language processing may prevent effective communication. Fillers are sometimes distracting.	and work-related topics when the accent or variety used is sufficiently intelligible for an international community of users. May fall to understand a linguistic or situational complication or an unexpected turn of events.	appropriate, and informative. Can initiate and maintain exchanges with reasonable ease on familiar topics and in predictable situations. Generally inadequate when dealing with an unexpected turn of events.
Elementary (Level 2)	Pronunciation, stress, rhythm, and intonation are heavily influenced by the first language or regional variation and usually interfere with ease of understanding.	Shows only limited control of few simple memorised grammatical structures and sentence patterns.	Limited vocabulary range consisting only of isolated words and memorised phrases.	Can produce very short, isolated, memorised utterances with frequent pausing and a distracting use of fillers to search for expressions and articulate less familiar words.	Comprehension is limited to isolated, memorised phrases when they are carefully and slowly articulated.	Response time is slow, and often inappropriate. Interaction is limited to simple routine exchanges.
Pre-Elementary (Level 1)	Performs at a level below the elementary level.	Performs at a level below the elementary level.	Performs at a level below the elementary level.	Performs at a level below the elementary level.	Performs at a level below the elementary level.	Performs at a level below the elementary level.

Note: Operational level (Level 4) is the minimum required proficiency level for radiotelephony communication.

Levels 1 through 3 describe pre-elementary, elementary and pre-operational levels of language proficiency respectively, all of which describe a level below the language proficiency requirement. Levels 5 and 6 describe extended and expert levels at levels of proficiency more advanced than the minimum required standard.

AMC2 ADR.OPS.B.029 Language proficiency

GENERAL

(a) The language competence assessment should be designed to reflect a range of tasks undertaken by vehicle drivers but with special focus on the knowledge of the language rather than knowledge of the operational procedures.

(b) The assessment should determine the applicant's ability

(1) communicate effectively using standard radiotelephony phraseology;

(2) deliver and understand messages in plain language in both usual and unusual situations that necessitate departure from standard radiotelephony phraseology; and

(3) deal with an unexpected turn of events and solve apparent misunderstandings.

AMC3 ADR.OPS.B.029(c) Language proficiency

ASSESSMENT

(a) The assessment should comprise the following three elements:

(1) listening: assessment of comprehension;

(2) speaking: assessment of pronunciation, fluency, structure and vocabulary; and

(3) interaction.

(b) The switch between phraseology and plain language should be assessed in relation to listening and speaking proficiency.

(c) The assessment should be conducted using the rating scale in AMC1 ADR.OPS.B.029.

GM1 ADR.OPS.B.029(c) Language proficiency

(a) When the assessment is not conducted in a face-to-face situation, appropriate technologies should be used for the assessment of the person's abilities to listen and speak, and to enable interactions.

(b) The assessment may also be conducted during training activities or during proficiency checks, with prior notification given to the person concerned.

GM1 ADR.OPS.B.029(e) Language proficiency

LANGUAGE PROFICIENCY ASSESSORS

(a) Persons responsible for language competency assessment ('assessors') should be suitably trained, including in the requirements specific to the language proficiency assessment, and qualified. They

should be either aviation specialists or language specialists with additional aviation-related training.

(b) Language proficiency assessors should undergo regular refresher training on language assessment skills.

(c) The preferred approach for an assessment would be to form an assessment team consisting of an operational expert and a language expert.

(d) The language proficiency assessors need to be trained in the requirements specific to the language proficiency assessment, and assessment and interlocution techniques.

GM1 ADR.OPS.B.029(e) Language proficiency

LANGUAGE PROFICIENCY ASSESSMENT

The aim of the assessment is to determine the ability of a person to speak and understand the language(s) used for radiotelephony communications.

(a) The assessment includes:

(1) voice-only or face-to-face situations;

(2) common, concrete and work-related topics for vehicle drivers.

(b) The assessment determines the applicant's speaking and listening abilities. A mere assessment of the grammatical knowledge, reading and writing is not appropriate.

(c) The assessment determines the language skills of the applicant in the following areas:

(1) pronunciation:

(i) the extent to which the pronunciation, stress, rhythm and intonation are influenced by the applicant's first language or national variations;

(ii) how much they interfere with ease of understanding.

(2) structure:

(i) the ability of the applicant to use both basic and complex grammatical structures;

(ii) the extent to which the applicant's errors interfere with the meaning.

(3) vocabulary:

(i) the range and accuracy of the vocabulary used;

(ii) the ability of the applicant to paraphrase successfully when lacking vocabulary.

(4) fluency:

(i) tempo;

(ii) hesitancy;

(iii) rehearsed versus spontaneous speech;

(iv) use of discourse markers and connectors.

(5) comprehension:

(i) on common, concrete and work-related topics;

(ii) when confronted with a linguistic or situational complication or an unexpected turn of events.

(6) interactions:

(i) quality of response (immediate, appropriate, and informative);

(ii) the ability to initiate and maintain exchanges:

(A) on common, concrete and work-related topics;

(B) when dealing with an unexpected turn of events;

(iii) the ability to deal with apparent misunderstandings by checking, confirming or clarifying.

The accent or variety of accents used in the test material should be sufficiently intelligible for an international community of users.

GM3 ADR.OPS.B.029(e) Language proficiency

Further guidance on the assessment of language proficiency may be found in ICAO Doc 9835 'Manual on the Implementation of ICAO Language Proficiency Requirement.

ADR.OPS.B.030 Surface movement guidance and control system

(a) The aerodrome operator shall ensure that a surface movement guidance and control system (SMGCS) is provided at the aerodrome. The SMGCS shall:

(1) take into account the design characteristics and the operational and meteorological conditions of the aerodrome, as well as human factors principles;

(2) be designed to assist in the prevention of:

(i) inadvertent incursions of aircraft and vehicles on an active runway; and

(ii) collisions between aircraft as well as between aircraft and vehicles or objects on any part of the movement area; and

(3) be supported by appropriate means and procedures.

(b) The visual aid components of a surface movement guidance and control system, i.e. markings, lights and signs shall be designed to conform with the relevant specifications.

(c) Where an SMGCS is provided by selective switching of stop bars and taxiway centre line lights, the following shall apply:

(1) taxiway routes, which are indicated by illuminated taxiway centre line lights, are capable of being terminated by an illuminated stop bar;

(2) the control circuits are so arranged that when a stop bar located ahead of an aircraft is illuminated, the appropriate section of taxiway centre line lights beyond it is suppressed; and

(3) the taxiway centre line lights are activated ahead of an aircraft when the stop bar is suppressed.

(d) As part of the surface movement guidance and control system, the aerodrome operator shall, in coordination with the air traffic services provider:

(1) establish SMGCS procedures at the aerodrome;

(2) assess the need to establish standard routes for taxiing aircraft on the aerodrome. Where standard routes are provided, the aerodrome operator shall:

(i) ensure that they are adequate and suitable for the aerodrome traffic, design and intended operations, and properly identified;

(ii) provide relevant information to the aeronautical information services provider for publication in the AIP.

(iii) establish fall back procedures to address failure of SMGCS component.

(e) Where the operation of the surface movement guidance and control system requires the use of a transponder by aircraft on the movement area, the aerodrome operator shall coordinate with the air navigation services provider:

(1) so that the relevant transponder operating procedures to be complied with by aircraft operators;

(2) the provision of the relevant information to the aeronautical information services provider for publication in the AIP.

(f) The aerodrome operator shall coordinate with the air traffic services provider in the development of the SMGCS procedures at the aerodrome.

AMC1 ADR.OPS.B.030(a) Surface movement guidance and control system

PARAMETERS TO BE CONSIDERED FOR THE DESIGN AND OPERATION OF A SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM

A surface movement guidance and control system should consider:

(a) the density of air traffic, and the operational needs of air traffic services;

(b) the visibility conditions under which operations are intended;

(c) the need for pilot, vehicle and pedestrian's orientation;

(d) the complexity of the aerodrome layout; and

(e) movements of vehicles.

GM1 ADR.OPS.B.030(a) Surface movement guidance and control system

GENERAL

The SMGCS is an appropriate combination of visual aids, non-visual aids, procedures, control, regulation and information facilities. Systems range from a very simple SMGCS at small aerodromes, with light air traffic operating in good-visibility conditions, to complex systems necessary at large aerodromes with heavy air traffic operating in low-visibility conditions. The system selected for an aerodrome will be appropriate to the operational environment in which the aerodrome will operate.

AMC1 OPS.B.030(b)(2) Surface movement guidance and control system

STANDARD TAXI ROUTES

(a) Where established, such routes should:

(1) cover aircraft taxiing between runways, aprons, and maintenance areas (if available);

(2) be direct, simple and, where practicable, designed to avoid conflicts with the routes of other aircraft or vehicles and capable of being used in all weather conditions;

(3) be identified by designators distinctively different from those of the runways and air traffic services routes; and

(4) be adequate and suitable for the largest aircraft likely to use them, taking as a minimum into account its interaction with the aerodrome facilities, navigation aids, aerodrome surfaces, jet blast effects, and the operation of other aircraft.

(b) where standard taxi routes are provided, details of such routes should be published in the AIP and chart or ground movement chart, depending on the complexity of the movement area, available aids and facilities.

Where a route includes taxiing between different areas of responsibility, (e.g. areas under control of air traffic services and the apron management services), the transition points should be indicated on either the aerodrome chart or ground movement chart.

GM1 ADR.OPS.B.030(b)(2) Surface movement guidance and control system

STANDARD TAXI ROUTES

Standard taxi routes may be provided in order to maintain or increase safety, regularity, and efficiency of operations especially in low-visibility conditions or high traffic, by minimising the amount of control intervention and the consequent volume of radiotelephony communications and workload.

However, as not all aerodromes:

(a) serve the same level of traffic or have the same traffic density;

(b) are operated in the same pattern, or under the same visibility conditions;

(c) have the same size, design and complexity,

the aerodrome operator needs to assess, in coordination with the air traffic services provider, the need to establish standard taxi routes. In this process, the views of the aerodrome users may also be sought, through the aerodrome's local runway safety team.

Further guidance for the development of standard taxi routes may be found in Chapters 3 and 6 of ICAO Doc 9476 'Manual of Surface Movement Guidance and Control Systems (SMGCS)'.

AMC1 ADR.OPS.B.030(b)(3) Surface movement guidance and control system

FALLBACK PROCEDURES

(a) When an essential component of the surface movement equipment is temporarily unserviceable or does not meet the minimum performance or technical requirements, the Aerodrome Operator should restrict the operational use of the aerodrome and, as a consequence, the traffic movement rate will be limited.

(b) Detailed fallback procedures should be established to address failures of essential components of the SMGCS.

AMC2 ADR.OPS.B.030(c) Surface movement guidance and control system

SURFACE MOVEMENT SURVEILLANCE SYSTEM

Surface movement surveillance system for the manoeuvring area should be provided at an aerodrome:

(a) when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities;

(b) when intended for use in Runway Visual Range conditions less than a value of 550 m;

(c) in the absence of visual observation of all or part of the Manoeuvring Area from an aerodrome control tower.

AMC3 ADR.OPS.B.030(c) Surface movement guidance and control system

SURFACE MOVEMENT SURVEILLANCE SYSTEM- USE

Surface movement surveillance system, when provided should be utilized to:

(a) monitor the movements of aircraft and vehicles on the manoeuvring area;

(b) provide directional information to pilots and vehicle drivers as necessary; and

(c) provide advice and assistance for the safe and efficient movement of aircraft and vehicles on the Manoeuvring Area.

GM1 ADR.OPS.B.030(c) Surface movement guidance and control system

Guidance on the use of surface movement surveillance system is given in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476) and in the Air Traffic Services Planning Manual (Doc 9426).

ADR.OPS.B.031 Communications

The aerodrome operator shall, in coordination with the air traffic services provider, establish communication procedures, including:

(a) the frequencies to be used for communication between the air traffic services unit and vehicles that intend to operate or are operating on the manoeuvring area;

(b) communication between the air traffic services unit and pedestrians that intend to operate or are operating on the manoeuvring area;

(c) dissemination of significant aerodrome-related information that may affect the safety of operations on the manoeuvring area, using radio communications;

(d) signals and other communication means that are to be used, in all visibility conditions, in the case of radio communication failure between the air traffic services unit and vehicles or pedestrians on the manoeuvring area.

GM1 ADR.OPS.B.031Communications

SITUATIONAL AWARENESS

(a) Pedestrians in the manoeuvring area may include maintenance staff or operations staff , carrying out maintenance activities or inspections by foot.

(b) Improving the situational awareness of vehicle drivers operating on the manoeuvring area is important, as it may also affect the situational awareness and decision-making of the air traffic services personnel and flight crews. Situational awareness is improved by conducting communications in a common frequency and language, whenever this is possible.

AMC1 ADR.OPS.B.031(d) Communications

RADIO COMMUNICATION FAILURE

(a) The signals to be used in case of radio communication failure between air traffic services and vehicles or pedestrians authorised to operate on the manoeuvring area should have the following meaning:

Lights signal from air traffic	Meaning
Green flashes	Permission to cross landing area or to move onto taxiway
Steady red	Stop
Red flashes	Move off the landing area or taxiway and watch out for aircraft
White flashes	Vacate manoeuvring area in accordance with local instructions

Table OPS 21 : Light signals from Air Traffic Services in case of vehicle radio communication failure

(b) In emergency conditions or if the signals in point (a) are not observed, the signal given below will be used for runways or taxiways equipped with a lighting system and should have the following meaning:

Light signal	Meaning
Flashing runway or taxiway lights	Vacate the runway and observe the tower for light signal

Table OPS 22 : Light signals for vehicle to vacate runway

(c) Care should be taken to ensure that the procedures address the case where, due to the prevailing visibility conditions, the light signals may not be seen by the driver or the pedestrian authorised to operate on the manoeuvring area.

(d) In case of agreement with the air traffic services provider to use other/additional communication means in the event of radio communication feature (e.g. mobile phones), the procedures should also cover the necessary practical details (e.g. telephone numbers to be used), as well as the order of the use of the agreed solutions.

ADR.OPS.B.033 Control of pedestrians

(a) The aerodrome operator shall establish and implement procedures to:

(1) limit the access to the movement area and other operational areas only to persons whose duties require them to have access to such areas;

(2) ensure that such persons are allowed unescorted access to such areas only if they have received relevant training and demonstrated their competence;

(3) control the movement of persons on the apron, and ensure that passengers embarking or disembarking an aircraft or who need to walk to, from or across the apron:

(i) are escorted by trained and competent personnel;

(ii) do not interfere with stationary aircraft and ground servicing activities;

(iii) are protected from operating aircraft, including the effects of their engines, as well as vehicular or other activities.

(b) The aerodrome operator shall establish and implement procedures to ensure:

(1) the orderly and safe entry and operation in the manoeuvring area of personnel whose tasks involve access to this area without a vehicle;

(2) that such personnel:

(i) are properly equipped, including with high-visibility clothing, orientation means, and means allowing two-way communication with the air traffic services unit and the respective unit of the aerodrome operator during such operations;

(ii) obtain authorisation from the air traffic services unit before entering the manoeuvring area. Notwithstanding such an authorisation, entry to a runway or runway strip or change in the operation authorised shall be subject to a further specific authorisation by the air traffic services unit;

(iii) do not enter the manoeuvring area when low-visibility procedures are in effect.

GM1 ADR.OPS.B.033(a) Control of pedestrians

GENERAL

(a) The procedures to prevent unauthorised access to the movement area and other operational areas of the aerodrome of persons who are not allowed to have access to such areas should be coordinated with the concerned authority responsible for security.

(b) In case passengers are embarking/disembarking on the apron, or if no transportation means is used for their transfer to/from the terminal building or from one stand to the other, then, apart from the need to ensure that passengers are always escorted, the procedures should, amongst others, include measures to ensure that:

(1) passengers do not pass under aircraft wings or beneath fuel vents, or close to the propellers or rotors of the aircraft they are boarding/disembarking or those of aircraft on adjacent stands;

(2) passengers remain clear of vehicular traffic around the aircraft, electrical cables, fuel hoses and other equipment;

(3) passengers use predetermined routes while moving from/to or across the apron; and

(4) passengers and any other persons on the apron are protected from the effects of engine jet-blast or downwash during their presence on the apron, including by restricting aircraft engine use.

(5) depending on the configuration of the apron, physical moveable barriers may also be used to indicate the desired route to follow and facilitate the control and movement of passengers

on the apron. When not in use, such equipment should be properly stowed to ensure that it does not become a source of FOD.

AMC1 ADR.OPS.B.033(b) Control of pedestrians

PERSONNEL OPERATING ON THE MANOEUVRING AREA

(a) Personnel allowed access to the manoeuvring area without the use of a vehicle should be equipped at least with personal protective equipment, suitable charts of the aerodrome, a radio for two-way communication on the appropriate air traffic services frequency, other means of communication as per the radio-communication failure procedure with the air traffic services unit, and other appropriate means to conduct their duties suitable to the situation and local conditions.

(b) The procedures should, as a minimum, provide information as to:

(1) which personnel can enter the manoeuvring area and for which purposes;

(2) the points from which entry to the manoeuvring area can take place;

(3) the hours and minimum visibility conditions that such an entry is allowed;

(4) communication with the air traffic services unit prior to entering the manoeuvring area and afterwards;

(5) communication with the respective unit of the aerodrome operator;

(6) actions to be taken in the event of radio communication failure ;and

(7) right of way between vehicles, pedestrians and aircraft.

(c) The procedures should be coordinated with the air traffic services unit.

ADR.OPS.B.037 Assessment of runway surface condition and assignment of runway condition code

Whenever the contaminants are present on the surface of a runway, the aerodrome operator shall:

(a) assign a Runway Condition Code (RWYCC) as appropriate;

(b) inspect the runway whenever the runway surface condition may have changed due to meteorological conditions, assess the runway surface condition and assign a new RWYCC;

(c) use special air-reports to trigger reassessment of RWYCC.

AMC1 ADR.OPS.B.037(a) Assessment of runway surface condition and assignment of runway condition code

RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)

The aerodrome operator should use the following RCAM in order to assign the RWYCC:

Runway condition assessment matrix (RCAM)			
		Downgrade assessment criteria	
RWYCC	Runway surface description	Aeroplane deceleration or directional control observation.	Special air-report of
6	DRY	-	-
5	WET (The runway surface is covered by any visible dampness or water	Braking deceleration is normal for the wheel braking effort AND directional control is normal.	GOOD
4		Braking deceleration OR directional control is between good and medium.	GOOD TO MEDIUM
3	WET ("SLIPPERY WET" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	More than 3 mm: STANDING WATER	Braking deceleration OR directional control is between medium and poor.	MEDIUM TO POOR
1		Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is	POOR
0		Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

Table OPS 23 : Runway Condition Assessment Matrix (RCAM)

Note: Runway Condition Assessment Matrix for reasons of simplicity reduced to wet and dry aerodromes only, as winter conditions do not apply to UAE aerodromes. For complete table including winter conditions refer to PANS-Aerodromes, Doc 9981.

GM1 ADR.OPS.B.037(a) Assessment of runway surface condition and assignment of runway condition code

AVAILABLE MEANS USED TO DETERMINE THE RWYCC

(a) The visual inspection of the movement area to assess the surface condition is the core method to determine the RWYCC. An overall assessment however implies more than that. The continuous monitoring of the development of the situation and the prevailing weather conditions is essential to ensure safe flight operations. Other aspects to be considered in the assessment result are the outside air temperature, the surface temperature, the dew point, the wind speed and direction, the effect of surface treatment, control and deceleration of the inspection vehicle, the special air-reports of braking action, the output from friction measuring devices, the weather forecast, etc. Due to interaction between them, a deterministic method on how these factors affect the RWYCC to be reported cannot be precisely defined.

(b) The RCAM supports the classification of runway surface conditions by their effect on aeroplane braking performance using a set of criteria identified and quantified based on the best industry knowledge, built upon dedicated flight testing and in-service experience. The thresholds at which a criterion changes the classification of a surface condition are intended to be reasonably conservative, without being excessively pessimistic.

(c) The following describes why the primary classification criteria in the RCAM have been set this way, and why it is important for aerodrome personnel to monitor and accurately report conditions when operating close to the boundaries of each RWYCC:

(1) Percentage of coverage with contamination in each runway third

A runway is considered contaminated whenever the extent of the coverage is more than a quarter of the surface of at least one third of the runway. It is important to note that whenever coverage is assessed to be below the 25 per cent threshold in each third, the computation assumption made by flight crew will be a dry runway (uniformly bare of moisture, water and contamination). It has been demonstrated that in conditions of contamination just below the reporting threshold but concentrated in the most unfavorable location, this assumption of dry runway still provides positive stop margins.

(2) Type of contaminant

Different contaminants affect the contact area between tyre and runway surface, where the stopping force is generated, in different ways. A water film of any depth leads to the partial (viscous aquaplaning) or total separation (dynamic aquaplaning) of the tyre from the surface. The smaller the surface, the smaller the force of adhesion, the less braking is available. Therefore, the maximum braking force decreases at higher speed and depends on contaminant depth. Other fluid contaminants have a similar effect. Hard contaminants, prevent the contact between tyre and runway surface completely and at any speed, effectively providing a new surface that the tyre rolls on. A deterministic classification of the stopping performance can be made only for the contaminants listed in the RCAM. For other reportable contaminants (oil, mud, ash, etc.), a large variance in the aeroplane performance effect exists, or insufficient data is available to permit a deterministic classification. An exception is rubber contamination, for which in-service data indicates that an assumption of RWYCC 3 provides a satisfactory performance margin. Runway surface treatments with sand, grit or chemicals may be very effective or even detrimental depending on the conditions of the application, and no credit can be attributed to such treatment without verification and validation.

(3) Depth of the contamination

The industry accepts that the threshold for the effect of depth of fluid contaminants on aeroplane performance is at 3 mm. Below this threshold, any type of fluid contaminant can be removed from the tyre/runway contact zone either by forced drainage or by compressing it into the macrotexture of the surface, thus allowing adhesion between tyre and surface to exist, albeit on less than the full footprint surface area. This is the reason why contamination depths up to 3 mm are expected to provide similar stopping performance as a wet runway. It should be noted that the physical effects causing reduced friction forces begin to take effect from very small film thickness, therefore damp conditions are considered to provide no better braking action than a wet runway. Aerodrome personnel need to be aware of the fact that the capability to generate friction in wet (or with thin layers of fluid contaminants) conditions is very dependent upon the inherent qualities of the runway surface (friction characteristics) and may be less than normally expected on poorly drained, polished or rubber contaminated surfaces. Above the 3 mm threshold, the impact on friction forces is more significant, leading to

classification in lower RWYCCs. Above this depth, and depending on the density of the fluid, additional drag effects start to apply, due to displacement or compression of the fluid and impingement on the airframe of the aeroplane. These latter effects depend on the depth of the fluid and affect the ability of the aeroplane to accelerate for take-off.

(d) The surface friction characteristics of a runway or a portion thereof can be degraded due to rubber deposits, surface polishing, poor drainage or other factors. The determination that a runway or portion thereof is slippery wet stems from various methods used solely or in combination. These methods may be functional friction measurements, using a continuous friction measuring device, that fall below a minimum defined standard.

(e) The Assessment of runway friction characteristics, observations by aerodrome maintenance personnel, repeated reports by pilots and aircraft operators based on flight crew experience, or through analysis of aeroplane stopping performance that indicates a substandard surface.

AMC1 ADR.OPS.B.037 (a);(b) Assessment of runway surface condition and assignment of runway condition code

ASSIGNMENT OF RUNWAY CONDITION CODE

(a) The aerodrome operator should:

(1) assign a RWYCC 6, if 25 per cent or less area of a runway third is wet or covered by contaminant;

(2) describe in the plain-language remarks part of the situational awareness section of the RCR the location of the area that is wet or covered by the contaminant, if the distribution of the contaminant is not uniform;

(3) assign a RWYCC based on the contaminant that will most likely affect the aeroplane's performance, if multiple contaminants are present and the total coverage is more than 25 per cent but no single contaminant covers more than 25 per cent of any runway third;

(4) not upgrade an assigned RWYCC 5, 4, 3, or 2; and

(5) not upgrade beyond RWYCC 3 an assigned RWYCC 1 or 0.

(b) The aerodrome operator may upgrade an assigned RWYCC 1 or 0 when all available means of assessing runway slipperiness, including properly operated and calibrated measuring devices, if available, have been used to support the decision.

(c) The aerodrome operator, when RWYCC 1 or 0 is upgraded, should assess the runway surface frequently during the period the higher RWYCC is in effect, to ensure that the runway surface condition does not deteriorate below the assigned code.

(d) The aerodrome operator, if sand or other runway treatments are used to support upgrading of the RWYCC, should assess the runway surface frequently to ensure the continued effectiveness of the treatment.

(e) The aerodrome operator should appropriately downgrade the RWYCC taking into consideration all available means of assessing runway slipperiness, including special air-reports.

(f) The aerodrome operator, when the primary assignment of the RWYCC in accordance with RCAM does not reflect the prevailing conditions accurately, and is supported by other observations, experience and local knowledge, should downgrade or upgrade the RWYCC. In this case:

(1) the RWYCC should be the downgraded or upgraded RWYCC following the overall assessment;

(2) the description of the runway surface contaminant will reflect the actual condition; and

(3) in the plain language remarks section of the RCR, the terms 'UPGRADED' or 'DOWNGRADED' should be used.

GM1 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

SINGLE AND MULTIPLE CONTAMINANTS

When single or multiple contaminants are present, the RWYCC for any third of the runway is determined as follows:

(a) When the runway third contains a single contaminant, the RWYCC for that third is based directly on that contaminant in the RCAM as follows:

(1) If the contaminant coverage for that third is less than 10 per cent, a RWYCC 6 is to be generated for that third, and no contaminant is to be reported. If all thirds have less than 10 per cent contaminant coverage, no report is generated; or

(2) If the contaminant coverage for that third is greater than or equal to 10 per cent and less than or equal to 25 per cent, a RWYCC 6 is to be generated for that third and the contaminant reported at 25 per cent coverage; or

(3) If the contaminant coverage for that third is greater than 25 per cent, the RWYCC for that third is based on the contaminant present.

(b) If multiple contaminants are present where the total coverage is more than 25 per cent but no single contaminant covers more than 25 per cent of any runway third, the RWYCC is based upon the judgement of the runway inspector, considering what contaminant will most likely be encountered by the aeroplane and its likely effect on the aeroplane's performance. Typically, this would be the most widespread contaminant, but this is not an absolute.

(c) The structure of the RCAM is ranking the contaminants in the column 'Runway surface description' from top to bottom and is having the most slippery contaminants at the bottom. However, this ranking is not an absolute, as the RCAM by design is landing oriented and if judged in a take-off scenario, the ranking could be different due to drag effects of loose contaminants.

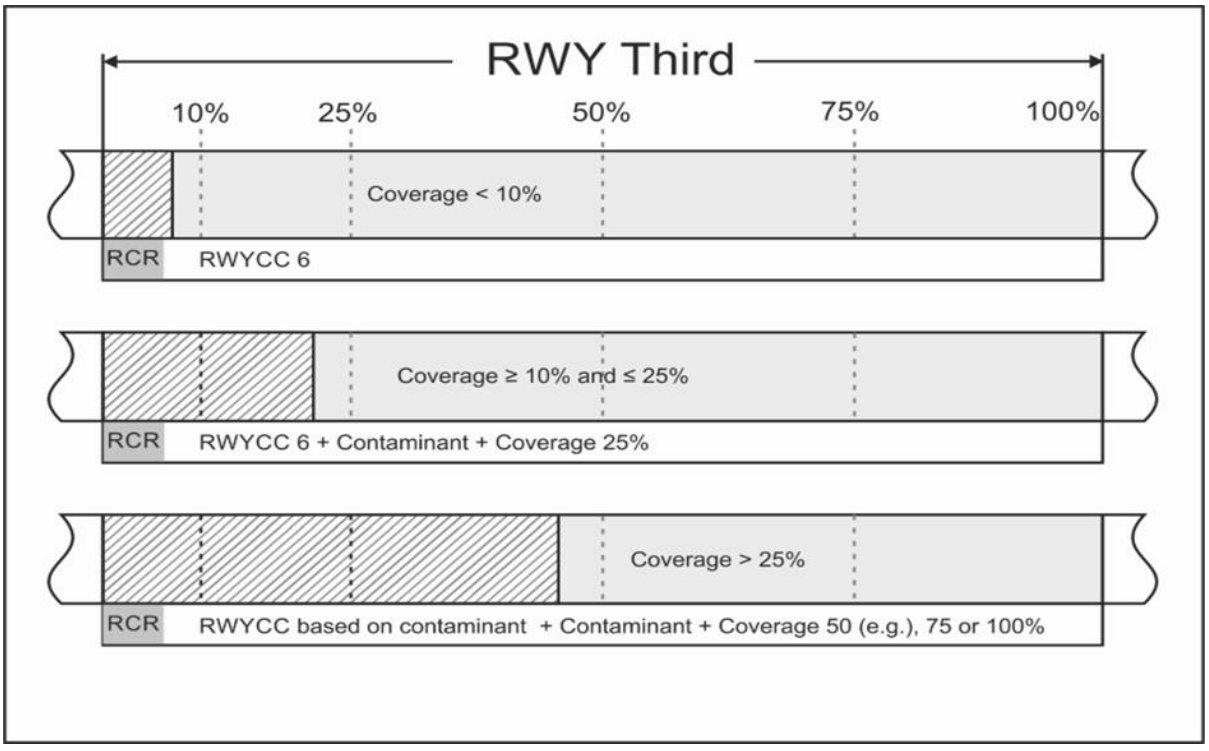


Figure OPS 29 : Single contaminant and % coverage

GM2 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

DOWNGRADING AND UPGRADING

(a) The RCAM allows making an initial assessment based on visual observation of contaminants on the runway surface: their type, depth and coverage, as well as the outside air temperature. Downgrading and upgrading is an integral part of the assessment process and essential to developing relevant reports of the prevailing runway surface condition.

(b) Examples of aspects to be considered in assessing the runway slipperiness for the downgrade process:

(1) Prevailing weather conditions

(i) stable sub-freezing temperature

(ii) dynamic conditions

(iii) active precipitation.

(2) Observations

(3) Measurements

(i) friction measurements

(ii) vehicle behavior

(iii) shoe scraping

(4) Experience (local knowledge)

(5) Special air-reports

(c) When the complete removal of contaminants cannot be achieved, but the RWYCC initially assigned does not reflect the real surface condition, the aerodrome personnel may apply the upgrade procedures. Upgrading is applicable only when the initial RWYCC is 0 or 1. Upgrading can only occur up to RWYCC 3.

(d) When upgrading RWYCC 0 and 1, a preponderance of evidence needs to exist pointing towards the higher RWYCC.

(e) When a friction measuring device is used for upgrading purposes, a preponderance of evidence needs to exist. In order to upgrade a RWYCC 0 or 1 to no higher than RWYCC 3, the friction measuring device needs to demonstrate an equivalent friction to that of a wet runway (RWYCC 5) or higher.

AMC1 ADR.OPS.B.037(c) Assessment of runway surface condition and assignment of runway condition code

USE OF SPECIAL AIR-REPORT

(a) The aerodrome operator should:

(1) re-assess the runway surface condition if RWYCC 2 or better has been reported and two consecutive special air-reports of POOR runway braking action are received; and

(2) re-assess the runway surface condition and consider the suspension of operations on that runway when one pilot has reported a LESS THAN POOR runway braking action.

(b) The aerodrome operator may use a special air-report of runway braking action for upgrading purposes only if it is used in combination with other information qualifying for upgrading.

GM1 ADR.OPS.B.037(c) Assessment of runway surface condition and assignment of runway condition code

USE OF SPECIAL AIR-REPORTS

(a) Special air-reports typically provide aerodrome personnel and other pilots with an observation that can confirm the ground-based assessment of or alert to degraded conditions experienced in terms of braking capability and/or lateral control during the landing roll. The braking action observed is dependent on the type of aircraft, aircraft weight, runway portion used for braking, and other factors.

(b) Pilots will use the terms GOOD, GOOD TO MEDIUM, MEDIUM, MEDIUM TO POOR, POOR and LESS THAN POOR.

(c) When receiving a special air-report, the recipient needs to consider that it rarely applies to the full length of the runway and is limited to the specific sections of the runway surface in which sufficient wheel braking was applied to reach friction limitation.

(d) As special air-reports are subjective and contaminated runways may affect the performance of different aeroplane types in a different way, the reported braking action may not be directly applicable to another aeroplane.

ADR.OPS.B.040 Night operations

The aerodrome operator shall ensure that means and procedures are established and implemented for providing safe conditions for aerodrome operation during night operations.

AMC1 ADR.OPS.B.040 Night Operations

GENERAL

The aerodrome operator for aerodromes operated at night should, in collaboration with air traffic services provider, ensure that visual aids are installed, operated, and maintained to permit aircraft operations to be performed safely.

ADR.OPS.B.045 Low visibility procedures

(a) The aerodrome operator shall develop and maintain measures required to support safe operations in Low Visibility Conditions (LVC) which shall be specified in local procedures as Low Visibility Procedures (LVP). This procedure shall be developed in coordination with air traffic service provider.

(b) Whilst air traffic service provider is responsible for advising pilots of the status of LVP at an aerodrome, it is the responsibility of the aerodrome operator to ensure that all measures required to protect aircraft operations in poor weather conditions are in place before advising ATC that LVP can be declared to be in force.

(c) Aerodrome operator shall ensure that unless the supporting services, procedures, equipment and facilities have been accepted/approved by the GCAA, Aerodrome Operator shall not permit:

(1) approaches and landings operations with visibility conditions less than 550m RVR or DH less than 200 ft (60m) in Category II and Category III meteorological conditions;

(2) take offs in RVR less than 550 meters;

(3) control of surface movements in meteorological conditions not permitting ATS to be carried out with visual reference;

(d) Aerodrome operator shall:

(1) include criteria for their preparation, initiation, and termination of LVP. The criteria shall be based on RVR and cloud ceiling values;

(2) develop safeguards for each phase of low visibility as a part of their LVP;

(3) provide information on low-visibility procedures to the aeronautical information services provider, for publication in the AIP;

(4) coordinate the movement of aircraft and vehicles;

(5) restrict and control vehicular traffic and activities on the movement area;

(6) establish the change on the status of the aerodrome equipment and facilities that have an impact on low-visibility operations;

(7) in consultation with local ATS, should determine the movement rate that they wish to sustain and develop LVP that will support the desired movement rate. The declared movement rate shall be notified to the UAE Area Control Centre (ACC). Additionally, if the aerodrome is unable to accept further aircraft due to lack of stand / parking facility or below minima , then area control shall be notified of the constrains.

(8) have procedures to demonstrate their preparedness and engagement with stakeholders for operations during LVP;

(9) develop and implement procedures to promulgate LVP information to airside users.

(e) Establish low visibility taxi routes in consultation with ATS.

(f) Surface Movement Guidance and Control System (SMGCS) shall be available at aerodromes intended for use during LVC to assist in prevention of incursions of aircraft and vehicles on active runways and associated critical and sensitive areas for ILS components.

(g) During operations in LVC controlled stop bars shall be provided at all taxiways giving access to active runways.

(h) Changes to critical facilities and associated limitations shall be disseminated to users without delay and if needed restrict the operations.

(i) Critical and sensitive areas of ILS/MLS/GLS shall be safeguarded.

(j) Intersection take-offs shall not be permitted in LVC.

(k) Operational runways shall not be used as taxi routes in LVC.

(l) Low-visibility procedures, and any changes thereto, shall require prior approval by the GCAA.

(m) LVP should be declared as cancelled only then the aerodrome operator withdraws any safeguarding measures.

AMC1 ADR.OPS.B.045(a) Low visibility procedures

GENERAL

(a) When low-visibility procedures (LVPs) are in effect, aerodrome operators should restrict persons and vehicles operating on the movement area to the essential minimum based on their nature and location;

(b) Aerodrome operators should develop and implement procedures to restrict airside works based on their area of work and nature of work and phases of LVP.

AMC1 ADR.OPS. B.045(d)1 Low visibility procedures

CRITERIA FOR THE PREPARATION OF LVP

(a) Aerodrome operators, in conjunction with the Air Traffic Service Providers should establish LVP phases and various thresholds based on RVR and cloud ceiling values. While doing so, the aerodrome operator should consider:

(1) the aerodrome layout and its complexity;

(2) the location of the control tower;

(3) the facilities and equipment available; and

(4) the density of traffic.

(b) The point at which LVP are implemented will vary from one aerodrome to another depending on local conditions and facilities available. However, a period of time is required to prepare and safeguard the aerodrome and, in particular, the movement area, in readiness for the LVP. The point at which LVP are to be implemented must be clearly defined in terms of:

(1) a specific RVR, expressed in meters, or cloud ceiling measurement, expressed as a height in feet, and

(2) must be promulgated in relevant notices and documentation to all those persons involved.

(c) Procedure should also include at what stage preparation for LVP safeguards must commence and to be communicated to all airside operators, in good time prior to implementation of the LVP. LVP safeguards should include, where applicable – restriction of works in the airside, restriction in the movement of vehicles, control of taxiways crossing runways or taxiways; physically barricading such areas that are identified by the aerodrome operator.

(d) Aerodrome operators, in conjunction with the Air Traffic Service Provider where applicable, should develop actions to ensure that, in good time prior to the implementation of LVP, all airlines and other organisations with movement area access are notified. This is particularly important where companies exercise control over their own apron areas and maintenance facilities adjacent to the manoeuvring area.

GM1 ADR.OPS.B.045(d) Low visibility procedures

Following guidance are provided to enable the aerodrome operators to formulate their own procedures in consultation with the air traffic services.

(a) Aerodrome should develop check list for actions to be taken during LVP;

(b) Stakeholders should also develop their own SOP depending on the nature and scope of their functions;

LVP Phase	Weather parameters	Actions
Phase 1	When MET visibility ≤ to 4500m and /or cloud ceiling less than 1000 ft. Forecasted visibility reducing to ≤ 1500m	Carry out runway inspection before commencement of LVP; Withdraw working teams, who are working in the vicinity of movement area.
Phase 2	When MET visibility ≤ 1500m and/ or cloud ceiling ≤ 500 ft.	Commence safeguard measure, withdraw free ranging.
Phase 3	RVR ≤ 600m and/or cloud ceiling ≤ 300ft	Only essential vehicles are allowed to operate in the airside; Close taxiway crossings.

Phase 4	Visibility > 1000m and improving and cloud ceiling ≥ 400ft.	Withdraw safeguards; Taxiway crossings to be opened.

Table OPS 24 : Sample only – LVP stages , weather thresholds and safeguards

GM1 ADR.OPS.ADR.045d(4)(5) Low visibility procedures

(a) Except as required for essential operational reasons vehicles should not be permitted on the Manoeuvring Area in LVC.

(b) When LVP are in force, only vehicles essential to the aerodrome operation and driven by formally tested and authorised drivers should be allowed on to the manoeuvring area. All such vehicles should be equipped with an airfield chart permanently displayed in the driver's cab clearly showing all taxiways, runways, holding points and vehicle routes marked with their appropriate designation. The chart should be accompanied by written instructions clearly detailing the action that the driver should take in the event that the vehicle should break down or that the driver should become unsure of his position on the airfield. In addition, all vehicles operating on the manoeuvring area should be equipped with R/T and the driver required to maintain contact with ATS at all times.

(c) Co-ordination procedures with airport security services should be established to ensure that only authorised personnel or vehicles gain access to the Movement Area during LVC.

(d) In order to protect aircraft operating on the ground in low visibilities, it is essential to prevent unauthorised vehicular traffic from entering the movement area. The area should, where practicable, be fenced and provided with manned controlled entry points. Where unguarded gates are provided, they should be kept locked and inspected regularly to ensure that they remain secure. Where physical closure is not practicable, for example between aircraft maintenance areas and manoeuvring areas, entry points should be manned and where the opening is too wide for visual surveillance, then it should be fitted with intruder detection equipment suitable for operation in low visibility conditions. By protecting the movement area in this manner, it should be possible to exclude unauthorised personnel who will not be aware of aerodrome traffic control procedures.

(e) Airport operators should identify the nature and location of works that may be permitted during various phases of LVP.

(f) During low visibility procedures the aerodrome operator should restrict construction or maintenance activities in the proximity of aerodrome electrical systems.

AMC1.OPS.B.045(d)(6) Low visibility procedures

COMMUNICATIONS EQUIPMENT

(a) Communication facilities should encompass all branches of the aerodrome services and agencies concerned with operations during LVC.

(b) Operations during LVC should be supported by adequate and reliable communications to enable immediate dissemination of essential information such as RVR readings, and prompt intervention to address contingency situations.

(c) Communication facilities should be provided with standby power supply.

(d) Requirements for Radiotelephony

(1) Ground vehicles should use frequencies separate from those used for control of aircraft, however a vehicle operating on a runway shall operate on the appropriate aerodrome control frequency.

(2) Separate RTF channels should be provided for control of aircraft and vehicular traffic on the aerodrome Movement Areas.

(3) Separate portable hand-held radios should be provided for all drivers and working parties operating on the Movement Area.

(4) All RTF frequencies used for control of aircraft or vehicles should be supported by dual transmitters and dual receivers for operation through main headphone/speaker and microphone facilities.

(5) A battery powered emergency transceiver should be available and selectable to any frequency used by Aerodrome Control.

AMC1 ADR.8.OPS.B.045(d)8 Low visibility procedures

RESPONSIBILITIES, PREPAREDNESS AND REVIEW OF LOW VISIBILITY PROCEDURES

(a) To test the LVP and assess the preparedness of all responsible stakeholders, aerodrome operators should carry out systematic table top exercises involving all stakeholders.

(b) The frequency of table top exercises should not be less than once per year.

GM1. ADR.OPS.B.045(d)8 Low visibility procedures

PREPAREDNESS AND REVIEW OF LOW VISIBILITY PROCEDURES

Aerodrome operators may use the following guidance to effectively carry out their table top exercise.

(a) Objective of the table top exercise, amongst other, should be:

(1) To ensure that all stakeholders involved are aware of their responsibilities and actions, and actions of others in LVP conditions;

(2) That all stakeholder's procedures are aligned to the LVP requirements;

(3) To test the effectiveness of LVP;

(4) To test the emergency procedures during LVP;

(b) In order to effectively conduct the table top exercise, aerodrome operators should:

(1) ensure a competent person is chairing or facilitating the exercise;

(2) prepare LVP scenario(s) for the exercise and explain to the group;

(3) invite representatives from all stakeholders involved in LVP including Airside operations, airfield maintenance, RFFS, ANSP, Ground handling companies, fueling companies, other service providers operating in the airside;

(4) provide aerodrome layout maps of the appropriate scale;

(5) competent person is available to take notes and actions;

(6) review against previously known Incidents and accidents.

(c) During the exercise

(1) aerodrome operator and the stakeholders can individually describe their process and actions to be initiated during LVP and check for alignment;

(2) it is a normal practice for ATC to initiate the exercise;

(3) all stakeholders can recap or review their action for various stages of LVP;

(4) ensure the exercise objectives are met.

(d) Post exercise

(1) forward notes and actions items to all participants;

(2) completion of actions – forward action plan to all participants and process through the appropriate forum.

GM3 ADR.OPS.B.045(d)(8) Low visibility procedures

SAFETY ASSESSMENT- LOW VISIBILITY OPERATIONS

(a) Due to the more demanding nature of operating in Low Visibility, there will normally be restrictions curtailing movement rates during LVC. While this may be acceptable at airports with low volumes of traffic under LVC, application of additional means such as improved lighting systems or Surface Movement Radar may be necessary to maintain required capacity. The safety assessment should consider the operational requirements of the airport and assess the need for additional measures to maintain the desired capacity.

(b) The end requirement of the safety assessment is to provide the means to institute the necessary equipment and procedures to maintain the required movement capacity at the airport and ensure that these operations are conducted safely.

(c) To ensure that all ground environment elements are properly integrated into the total system, the airport operator should form a working group composed of representatives of all sections concerned with equipment or services associated with low visibility operations.

(d) These should include, but not be limited to, air traffic services, meteorological services, the engineering section(s) responsible for establishment and/or maintenance of visual and non-visual aids and power supply, rescue and firefighting services, airport security, ground support providers and major operators. The group should appoint a coordinator who should be responsible for the accomplishment of the whole task.

(e) A preliminary safety assessment should be carried out to ensure that an adequate level of safety can be achieved during LVC. The safety assessment should be carried out in accordance with these regulations and appropriate ICAO documentation. An assessment of the magnitude of any increase in operating risk resulting from lack of control by visual means should be made, taking into account the lowest RVR at which operations are planned. The purpose of the safety assessment is to eliminate this risk by the application of additional control techniques, procedures and aids which will constitute the LVP for the airport.

(f) The working group should identify required actions to be taken and establish a work programme encompassing all issues related to LVC.

(g) The aerodrome operator should ensure that facilities, equipment and operating conditions are in accordance with current safety regulation and local instructions.

(h) The working group should carry out and document a preparatory process, including a timetable for completion of preliminary studies, installation and verification of visual and non-visual aids and for development of procedures required to ensure safe operations in LVC.

(i) Summary of actions to be taken:

(1) examination of movement statistics for aircraft and vehicles;

(2) examination of aeronautical meteorological records to establish the requirements for additional facilities and services for operating in LVC;

(3) evaluation of meteorological limits for establishment and discontinuation of LVP;

(4) examination of instrument, measuring and recording equipment and procedures used by meteorological services;

(5) evaluation of obstacle environment against limitations surfaces;

(6) Examination of the airport environs for lights that may dazzle or confuse pilots during LVC;

(7) Evaluation of approach, runway and taxiway lighting, runway, taxiway and apron markings as well as signage for suitability under LVC;

(8) Examination of non-visual guidance systems, particularly all components of ILS and associated monitoring systems, including calibration records, for the intended type(s) of operation;

(9) Determination of critical and sensitive areas for ILS components;

(10) Evaluation of instructions to, and recording systems employed by, engineering support services responsible for visual and non-visual aids, meteorological instrumentation and power supply;

(11) Evaluation of requirements for communications between ATC and aircraft, vehicles, rescue and firefighting services, meteorological services, engineering support, security, apron

control, other ATC units, air traffic flow management and other units/services affected by LVC;

(12) Examination of terrain conditions in the final approach areas for impact on radio altimeter indications;

(13) Evaluation of airport lay-out with particular attention to taxi routes between aprons and runways, ground traffic routes, service roads, ground traffic control points, movement area entrances and existing aids;

(14) Evaluation of the requirements for aeronautical information material, hereunder AIP entries, aeronautical charts ,for LVC;

(15) Evaluation of requirements for local aeronautical information services, hereunder communication facilities such as ATIS to provide timely information to operators;

(16) Evaluation of operational Letters of Agreement for suitability for LVC;

(17) Evaluation of existing ATC instructions, operational instructions and company rules that are relevant to the general movement scenario;

(18) Determination of desired movement rates during LVC;

(19) Evaluation of safety requirements for safe provision of ground support services, such as re-fuelling, cleaning, maintenance, cargo-and baggage handling and catering services;

(20) Examination of surveillance systems for ground movements;

(21) Evaluation of marking and equipment of vehicles permitted on the movement area during LVC;

(22) Evaluation of standard operating procedures for operation staff;

(23) Evaluation of experience and training requirements for operational staff;

(24) Evaluation of the risk of runway incursions. This should include evaluations of records of runway and taxiway incursions;

(25) Evaluation of existing airport security measures;

(26) Evaluation of impact on rescue and firefighting services' ability to perform in a timely and efficient manner;

(27) Examination of documentation-, investigation- and reporting procedures covering movement and meteorological data, serviceability of equipment and systems as well as incidents;

(j) The safety assessment should be considered by the working group through the Safety Management System approach and must be completed at an early stage of the implementation process. The general picture derived from the study should identify mitigation measures to be implemented as part of the LVC approval process.

(k) A procedure should be established to ensure that the required provisions are amended or updated as a consequence of new developments.

AMC1 ADR.OPS.B.045(f) Low visibility procedures

VISUAL AIDS

(a) Continuous guidance should be provided from the taxiway until adequate guidance by the docking / parking system is assured.

(b) Lighting on a closed runway or taxiway or portion thereof should not be operated during LVC.

(c) Detailed fallback procedures should be established to address failures of essential lighting components of the SMGCS.

(d) During operations in LVC ,stop bars, should be provided at all taxiways giving access to active runways

(e) For operations with an RVR less than 300 metres, taxiway intersection and Intermediate Holding Position lights should be implemented along defined taxi routes.

(f) SMGCS and signs should support standard LVP taxi routes.

AMC1 ADR.OPS.B.045(h) Low visibility procedures

EQUIPMENT FAILURES TO BE REPORTED

(a) Detailed fallback procedures should be established to address failures of essential lighting components of the SMGCS.

(b) As a minimum requirement, the following equipment failures should be reported to relevant stakeholders if the system is degraded or unserviceable or if back-up procedures cannot provide the same level of service:

Equipment failure to be reported – low-visibility departure operations	
System considered	Failure to be reported
ILS (Where used for guided take-off)	ILS localiser downgraded to CAT II. ILS localiser downgraded to CAT I. ILS out of service.
GBAS (Where used for guided take-off)	GBAS downgraded to CAT II. GBAS downgraded to CAT I. GBAS out of service
RVR	Touchdown RVR system unserviceable. Other RVR systems unserviceable.
Lighting systems AND ANCILLARY	Runway lighting unserviceable- end lights. Runway centre line lighting unserviceable. Runway edge lighting unserviceable.
	Stop bars unserviceable. Ceilometer unserviceable. Anemometer unserviceable.
Equipment failure to be reported – approach and landing operations	
ILS	ILS downgraded to CAT II. ILS downgraded to CAT I. ILS out of service.
GBAS	GBAS downgraded to CAT II. GBAS downgraded to CAT I, GBAS out of service.
DME	DME (as alternative to marker beacons) unserviceable.
RVR	Touchdown RVR system unserviceable. Other RVR systems unserviceable.

Lighting systems	Approach lighting unserviceable. Threshold Runway lighting unserviceable. Runway centre line lighting unserviceable. Runway edge lighting unserviceable. Taxiway lighting system unserviceable. RETILs.
Ancillary	Stop bars unserviceable. Ceilometer unserviceable. Anemometer unserviceable.

GM1 ADR.OPS.B.045(h) Low visibility procedures

FACILITIES

(a) When LVC are planned for an airport, all facilities must be considered and assessed for suitability. The guidance detailed in this GM must be considered in conjunction with appropriate CAR and documents related to the airport and its facilities.

(b) The specific types of operations requiring establishment of LVP are:

(1) Low Visibility Take-off;

(2) Approach and landing operations in Category II and III weather conditions;

(3) Deteriorating weather conditions, which preclude full visual observation of the manoeuvring area.

(c) The physical characteristics of runways and taxiways, and the characteristics of pre-threshold terrain should be carefully considered to ensure safe operations in LVC.

(d) The conduct of LVP depends on the existence of suitable runway protection measures, surface movement guidance and control, emergency procedures and apron management.

AMC1 ADR.OPS.B.045(l) Low visibility procedures

LOW VISIBILITY TAXI ROUTES

(a) The aerodrome operator should, in coordination with air traffic services, establish low-visibility taxi routes.

(b) Low visibility taxi routes should be established and enforced in LVC to facilitate navigation, reduce traffic complexity and minimise risk of runway incursions.

(c) Low visibility taxi routes should minimise manoeuvring between runway and apron.

(d) On the selected taxi-routes for ground operations during LVC, the signs essential to the ground operations should be lighted internally.

(e) Low visibility taxi routes should be indicated on charts.

ADR.OPS.B.050 Operations in adverse weather conditions

The aerodrome operator shall ensure that means and procedures are established and implemented to ensure the safety of aerodrome operations in adverse weather conditions.

AMC.OPS. B.050 Operations in adverse weather conditions

GENERAL

(a) The aerodrome operator should, together with the air traffic services, ground handlers, re-fuelers and other relevant parties operating at the aerodrome, establish and implement procedures required to mitigate the risk of operation of the aerodrome under adverse weather conditions such as strong winds, heavy rain, sandstorms, lightning and thunderstorms, including the suspension of operations on the runway(s) if deemed necessary.

Procedure should include:

(1) overview of the methodology in determining adverse weather conditions such as high-winds, heavy rains, lightening or sandstorms;

(2) any contingency plan that may be applicable;

(3) description of procedure or system used to notify aerodrome stakeholders (ground based) of adverse weather conditions;

(4) roles of the persons responsible for control of the procedures related to Adverse Weather Conditions at the aerodrome.

(b) Aerodromes that do not operate in LVC should also develop and maintain procedure in a manner that ensure proper and appropriate safeguards, which includes dissemination of information to airside users on the operational status of the aerodrome.

ADR.OPS.B.055 Fuel quality

The aerodrome operator shall verify that organisations involved in storing and dispensing of fuel to aircraft have procedures to ensure that aircraft are provided with uncontaminated fuel and of the correct specification.

AMC1 ADR.OPS.B.055 Fuel quality

GENERAL

The aerodrome operator should verify, either by itself or through arrangements with third parties, that organisations involved in storing and dispensing of fuel to aircraft, implement procedures to:

(a) maintain the installations and equipment for storing and dispensing the fuel in such condition so as not to render unfit for use in aircraft;

(b) mark such installations and equipment in a manner appropriate to the grade of the fuel;

(c) take fuel samples at appropriate stages during the storing and dispensing of fuel to aircraft, and maintain records of such samples; and

(d) use adequately qualified and trained staff in storing, dispensing, and otherwise handling fuel on the aerodrome.

AMC2.ADR.OPS.B.055 Fuel quality

COMPLIANCE

The aerodrome operator, in order to ensure compliance, could use:

(a) audit reports of organisations involved in storing and dispensing of fuel to aircraft, or

(b) relevant national procedures providing for the assurance of fuel quality.

ADR.OPS.B.065 Visual aids and aerodrome electrical systems

(a) The aerodrome operator shall have procedures to ensure that aerodrome visual aids and electrical systems function as intended.

(b) Adequate primary power supply shall be available at aerodromes for the safe functioning of air navigation facilities.

(c) The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure will not leave the pilot with inadequate visual and non-visual guidance or misleading information.

AMC1 ADR.OPS.B.065 Visual aids and aerodrome electrical systems

GENERAL

(a) The aerodrome operator should establish a monitoring system of aerodrome ground lights so as to inform the air traffic services provider when safe operation is no longer possible.

(b) The aerodrome operator should establish, procedures for the operation of visual aids and, in coordination with the air traffic services provider, procedures to be implemented in the event of unserviceability of stop bars. The procedures should cover the situation where the stop bars cannot be turned off because of a technical problem, and the measures to be taken should not undermine the principle that a lit stop bar must not be crossed.

(c) The aerodrome operator should establish procedures for the provision and removal of temporary markings, lights and signs.

ADR.OPS.B.070 Aerodrome works safety

The aerodrome operator shall establish and implement procedures to ensure that:

(a) aircraft safety is not affected by aerodrome works;

(b) aerodrome works safety is not affected by aerodrome operational activities;

(c) airfield work permit system is established and implemented involving all relevant stake holders.

AMC1 ADR.OPS.B.070 Aerodrome works safety

GENERAL

(a) The procedures should be appropriate to the volume and nature of operations at the aerodrome.

(b) Construction or maintenance work on the movement area, or work affecting aerodrome operations should be planned, established, implemented, or approved by the aerodrome operator.

(c) The scope of work, physical extent, and time period should be notified to the relevant parties concerned. If such work will render limitations to the use of a particular runway, additional measures should be implemented to ensure safety. In case the works necessitate the temporary

change of the declared distances of the runway, a recalculation of the declared distances should be performed, in accordance with an established procedure, and the relevant information should be provided to the GCAA, the air traffic services and aeronautical information services unit, before the implementation of the new declared distances. The aerodrome operator should also request the broadcast of relevant information via the local ATIS.

(d) Roles and responsibilities for operations and tasks associated with the reduction of runway length available and the work in progress (WIP) are clearly understood and complied with.

(e) The aerodrome operator should put in place appropriate measures to monitor the safety of the aerodrome and aircraft operations during aerodrome works such that timely corrective action is taken when necessary to assure continued safe operations.

(f) The aerodrome operator should ensure the works site is returned to operational use in a safe and timely manner by ensuring:

(1) the works site is cleared of personnel, vehicles, and plant in a safe and timely manner;

(2) the affected area is inspected for operational serviceability in accordance with the hand-back procedures; and

(3) relevant authorities or organisations are notified of the restoration of aerodrome serviceability in accordance with procedures, using suitable means of communication.

(g) The procedures for planning and carrying out works safely, on or in the vicinity of the Movement Area or those areas that may extend above the obstacle limitation surfaces, including the following:

(1) description of methodology used for the development of a safety plan, including the development of checklists and control of contractors working airside; Description of methodology used for implementing works safety plan including use of works notification systems and work authority permits;

(2) description of procedures used for closing off, reopening areas for aircraft use and the formal acceptance of Work Areas prior to returning them to serviceability on a daily basis;

(3) description of the supervision arrangements for early detection of deviations from intended practices or procedures or systems, if applicable;

(4) arrangement for communicating with the Air Traffic Services Unit and/or Apron Management Service Unit during the progress of such works.

AMC1 ADR.OPS.B.070(a) Aerodrome works safety

RUNWAY PAVEMENT OVERLAYS

The aerodrome operator should ensure that:

(a) when a runway is to be returned temporarily to an operational status before resurfacing is complete, the longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, should be:

(1) 0.5 to 1.0 %for overlays up to and including 5 cm in thickness; and

(2) not more than 0.5 % for overlays more than 5 cm in thickness.

(b) runway overlaying proceeds from one end of the runway towards the other end so that based on runway utilisation, most aircraft operations will experience a down ramp.

(c) the entire width of the runway is overlaid during each work session.

(d) before a runway being overlaid is returned to a temporary operational status, a runway centre line marking, conforming to the applicable specifications included in the aerodrome certification specification of the aerodrome, should be provided.

(e) the location of any temporary threshold should be identified by a 3.6 m wide transverse stripe.

(f) the overlay should be constructed and maintained above the minimum friction level.

GM1 ADR.OPS.B.070(a) Aerodrome works safety

RUNWAY PAVEMENT OVERLAYS

(a) For runway pavement overlay projects when the runway is to be returned temporarily to an operational status before resurfacing is complete. This may necessitate a temporary ramp between the new and old runway surfaces.

(b) Guidance on overlaying pavements and assessing their operational status is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 3.

AMC2 ADR.OPS.B.070(a) Aerodrome works safety

MARKING AND LIGHTING OF UNSERVICEABLE AREAS

(a) The aerodrome operator should ensure that:

(1) unserviceability markers are displayed whenever any portion of a taxiway, apron, or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely;

(2) on a movement area used at night, unserviceability lights should be used; and

(3) unserviceability markers and lights are placed at intervals sufficiently close so as to delineate the unserviceable area.

(b) Unserviceability markers should consist of conspicuous upstanding devices such as flags, cones, or marker boards.

(c) Unserviceability markers and lights should meet the specifications described in CS.ADR.DSN. R.870.

AMC3 ADR.OPS.B.070 Aerodrome works safety

CLOSED RUNWAYS AND TAXIWAYS, OR PARTS THEREOF

The aerodrome operator should ensure that:

(a) a closed marking as defined in CS ADR-DSN.R.855(c) is displayed on a temporarily closed runway, or taxiway, or a portion thereof, except that such a marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided;

(b) lighting on a closed runway or taxiway, or a portion thereof is not operated, except as required for maintenance purposes; and

(c) in addition to closed markings, when the runway, taxiway, or portion thereof is closed and is intercepted by a usable runway or taxiway which is used at night, unserviceability lights as defined in CS ADR-DSN.R.870(c) should be placed across the entrance to the closed area at intervals not exceeding 3 m; and

(d) a closed runway or taxiway marking as defined in CS ADR-DSN.R.855(c), or a portion thereof, is

displayed on new runways and taxiways that are still under construction;

(e) when possible, taxiway centerline lines leading to a closed area (long term closure) should be obliterated. Similarly, taxiway centerlines lights leading to the closed area should not be lit.

GM1.ADR.OPS.B.070(a)(b) Aerodrome works safety

MAINTENANCE WORKS

(a) Persons entering the movement area to perform maintenance should have a formal approval by the aerodrome operator.

(b) Entrance to the movement area should be subject to clearance by the unit responsible for that area (ATC, apron management, aerodrome operator, etc.) using appropriate means (R/T, telephone, etc.).

(c) Individuals carrying out maintenance works should comply with local rules and aerodrome operator's concerning the control and operation of vehicles in the movement area.

GM2 ADR.OPS.B.070(a)(b) Aerodrome works safety

USE OF UNSERVICEABILITY LIGHTS

(a) When lights are used to mark temporary unserviceable areas at night or during reduced visibility conditions, these lights mark the most potentially dangerous extremities of the area. A minimum of four such lights could be used, except where the area is triangular in shape where a minimum of three lights may be employed.

(b) The number of lights may be increased when the area is large or of unusual configuration. At least one light should be installed for each 7.5 m of peripheral distance of the area. If the lights are directional, they should be orientated so that, as far as possible, their beams are aligned in the direction from which aircraft or vehicles will approach.

(c) Where aircraft or vehicles will normally approach from several directions, consideration should be given to adding extra lights or using omnidirectional lights to show the area from these directions. Unserviceable area lights should be frangible.

(d) Their height should be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

GM3 ADR.OPS.B.070(a)(b) Aerodrome works safety

USE OF TEMPORARY RUNWAY MARKINGS

(a) Circumstances may occur when it is not practicable to install permanent markings, for example during runway resurfacing. In order to provide sufficient visual guidance to aircraft, the following markings should be considered:

(1) runway centre line;

(2) taxiway centre line lead on/off;

(3) runway edge line;

(4) runway threshold; and

(5) touchdown zone and aiming point markings.

(b) Centre line and edge marking widths can be replaced by temporary markings of reduced width from 0.9 m to 0.6 m, if required.

(c) Touchdown zone and aiming point markings should be painted as soon as possible after the resurface of the runway.

(d) Threshold markings should be painted as soon as possible, using temporary materials before making them permanent.

GM4 ADR.OPS.B.070(a)(b) Aerodrome works safety

CLOSED RUNWAY AND TAXIWAY MARKINGS — AVOIDING THE LACK OF CONTRAST

(a) In certain circumstances, e.g. due to the colour of the material used during construction works, there may be insufficient contrast between the colour of the surface of the runway or taxiway and the colour of the respective closed runway or taxiway marking, even though the latter conforms to the applicable specifications.

This may result in the closed runway or taxiway markings not fulfilling their purpose. To avoid the lack of contrast, the closed runway or taxiway markings need to be included in an appropriate border, whose colour is black.

(b) At aerodromes where operations take place at night, the closed runway or taxiway markings would be made with reflective materials designed to enhance their visibility. Guidance on reflective materials is given in Part 4 ‘Visual Aids’ of ICAO Doc 9157 ‘Aerodrome Design Manual’.

AMC1 ADR.OPS. B.070(c) Aerodrome works safety

WORK PERMIT SYSTEM

Aerodrome operator should establish an airside work permit system which should include:

(a) methodology to communicate and seek comments from all involved stake holders on airside works that has an impact on aircraft operations;

(b) minimum standards for closure of work area;

(c) promulgation of NOTAM when needed;

(d) work area monitoring;

(e) procedures for control of contractors.

GM1.ADR.OPS.B.070(c)Aerodrome works safety

MINOR CONSTRUCTION/MAINTENANCE WORK

(a) A system of work permits should be established for minor works on the movement area.

(b) The objectives of the work permits should be such that:

(1) no work takes place on the movement area without the knowledge of aerodrome operator's staff and air traffic services (where applicable);

(2) permitted times of work are strictly followed; and all individuals taking part in the work are briefed in detail on the following:

(i) precise areas in which work may be done;

(ii) the routes to be followed to and from the working area;

(iii) the R/T procedures to be used;

(iv) the safety precautions to be observed , the maintenance of a listening watch and the use of look-outs; and

(v) the reporting procedure to be followed on completion of work.

(c) At the conclusion of work, aerodrome operator's staff, or other appropriate staff, should inspect the working area to ensure that it has been left in a satisfactory condition.

(d) Refer to CAR AGA , Part ACM for guidance on hot work requirements.

GM2 ADR.OPS.B.070(c) Aerodrome works safety

MAJOR CONSTRUCTION/MAINTENANCE WORK

(a) Before the commencement of any substantial work on the movement area, a liaison group comprising representatives from the aerodrome operator, air traffic services, apron management services, if applicable, and subcontractors' agents should be established.

(b) The group could meet, as often as considered necessary, to review progress, and consider the need for any change in working practices to meet operational requirements.

(c) As far as practicable, working areas should be blocked off from the active parts of the movement area by the erection of physical barriers.

(d) Consideration should be given to the marking and lighting of barriers.

(e) The lights of taxiways leading into working areas should be permanently 'off'.

(f) Before works commence, the following should be established:

(1) the hours of work;

(2) the authorised routes;

(3) the communications facilities to be used;

(4) the permitted heights of vehicles and equipment, and the limitations to be placed on operating heights of cranes; and

(5) any limitation to be placed on use of electrical equipment which might cause interference with navigational facilities or aircraft communications.

(g) Contractors should be briefed for possible hazards to personnel working on aerodromes, in particular the jet blast problem and noise.

(h) Where contractors work on or traverse aircraft pavement areas, these areas should be inspected thoroughly before they are opened again for aircraft use, with particular attention to the presence of debris and the general cleanliness of the surface.

(i) Where aircraft are constantly using areas open to contractors, inspections at frequent intervals are required to ensure the continuing operational safety of the aerodrome.

(j) Adequate marking arrangements should be provided for crane jibs when extra conspicuity is considered desirable.

(k) If work is of prolonged duration, a constant watch is required to ensure that the marking and lighting of obstacles and unserviceable areas does not degrade below acceptable limits.

(l) The effect of tall cranes on ILS and radar, in conjunction with those responsible for electronic landing aids and steps taken to reduce limitations to the minimum, should be considered.

ADR.OPS.B.075 Safeguarding of aerodromes and surroundings

(a) Aerodrome operator shall monitor on the aerodrome and its surroundings, considering the planned or intended mode of operation for the runway:

(1) obstacle limitation and protection surface as established in accordance with the applicable certification specification, and other surfaces and areas associated with the aerodrome, in order to take, within its competence, appropriate action to mitigate the risks associated with the penetration of those surfaces and areas;

(2) marking and lighting of obstacles in order to be able to take action within the safeguarded area associated with the aerodrome, as appropriate; and

(3) hazards related to human activities and land use in order to take action within the safeguarded area associated with the aerodrome, as appropriate.

(b) The aerodrome operator shall have:

(1) procedures in place for assessing and mitigating the risks associated with obstacles, developments and other activities within the monitored areas that could impact on the safe operations of aircraft operating at, to or from the aerodrome;

(2) agreements in place with applicable local planning authorities, and municipalities for the continuous assessment of developments, land use and activities around the aerodrome, that may jeopardise the safe operation of aircraft;

(3) procedures in place for the regular inspection of obstacles to ensure that they remain in compliance with the requirements of this CAR;

(c) responsibility for control of obstacles within the OLS may be delegated to a third-party subject to a formal agreement, which includes clearly defined set of criteria.

(d) An aerodrome operator shall ensure the conduct of an obstacle survey by a competent surveyor to establish the initial coordinates and details of obstacles and periodic survey thereafter as described in CAR ASP Part ASSP;

(e) Terrain and Obstacle Data Collection: To satisfy requirements necessary to accommodate air navigation systems or functions, sets of electronic terrain and obstacle data shall be collected and recorded in databases by the aerodrome operator, and reported to the Aeronautical Information Service for promulgation;

(f) Aerodrome operator shall ensure that the ILS critical and sensitive areas are protected as required by CAR ANS, Part CNS- CNS.GTR.330 Physical Infrastructure and Security (g).

(g) Procedure for monitoring and reporting of such non-aeronautical lights which may confuse or mislead pilots and non-aeronautical ground light near an aerodrome which may endanger the safety of aircraft and which shall be extinguished, screened, or otherwise modified so as to eliminate the source of danger.

AMC1.OPS.B.075 Safeguarding of aerodromes and surroundings

GENERAL

(a) The Aerodrome Operator should have procedures to monitor the changes in the obstacle environment, marking and lighting, and in human activities or land use on the aerodrome and the areas around the aerodrome, as defined in coordination with the Appropriate Authority.

The scope, limits, tasks and responsibilities for the monitoring should be defined in coordination with the relevant air traffic services providers, and with the Appropriate Authority and other relevant authorities and should ensure the protection of sight lines from the established air traffic control , apron management service unit, ARFF watch rooms , from permanent or temporary obstacles or activities;

The scope, limits, tasks and responsibilities for the mitigation of risks associated to obstacles or hazards outside the perimeter fence of the aerodrome should be defined in coordination with the relevant air traffic services providers, and with the Appropriate Authority/ and or other relevant authorities.

(b) The risks caused by human activities and land use which should be assessed and mitigated, should include but not limited to:

(1) obstacles and the possibility of induced turbulence;

(2) the use of hazardous, confusing, and misleading lights;

(3) the dazzling caused by large and highly reflective surfaces;

(4) sources of non-visible radiation, or the presence of moving, or fixed objects which may interfere with, or adversely affect, the performance of aeronautical communications, navigation and surveillance systems.

(5) waste disposal facilities, establishment of land or water features or any other activity or development that may attract birds/wildlife and contribute to creating a hazard to aircraft.

(6) non-aeronautical light near an aerodrome which may endanger the safety of aircraft and which should be extinguished, screened, or otherwise modified so as to eliminate the source of danger.

(c) In the case of aeronautical ground lights near navigable waters, consideration needs to be given to ensuring that the lights do not cause confusion to mariners.

AMC1 ADR.OPS.B.075(b)(3) Safeguarding of aerodromes and surrounding

INSPECTIONS

(a) These inspections should be conducted on a quarterly basis.

(b) These inspections should be conducted from both within and outside the immediate aerodrome boundary.

(c) Records of the inspections should be maintained along with reports of any follow-up action may have been conducted following the identification of a non-serviceable obstacle light.

AMC1 ADR.OPS.B.075(d) Safeguarding of aerodromes and surrounding

THE PERIODICITY OF THE SURVEY

Periodicity of the survey and other survey requirements should be established and carried out as required in CAR.ASP,PART.ASSP.

AMC2 ADR.OPS.B.075(d) Safeguarding of aerodromes and surrounding

REPORTING TO AIS

The geographical coordinates of terrain and obstacles in Area 2, and Area 3 shall be measured, as well as terrain data in Area 4, and reported to the Aeronautical Information Service in degrees, minutes, seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the Aeronautical Information Service.

AMC1 ADR.OPS.B.075(f) Safeguarding of aerodrome and surrounding

ILS CRITICAL AND SENSITIVE AREA

(a) Refer CAR ANS, Part CNS, AMC3 CNS.GTR.330(g) Physical Infrastructure and Security

(b) The frangibility of fixtures within the runway strips shall comply with the frangibility requirements and poses no RF reflections or CNS equipment interferences.

GM1 ADR.OPS.B.075(f) Safeguarding of aerodrome and surrounding

Guidance on frangibility is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 6, Frangibility.

GM1 ADR. OPS.B.075.Safeguarding of aerodromes and surrounding

OTHER SURFACES TO BE MONITORED

(a) Other surfaces associated with the aerodrome are surfaces that need to be monitored when operating in accordance with ICAO PANS-OPS Doc 8168, Volume II.

(b) The limits of the aerodrome surroundings that should be monitored by the Aerodrome Operator are defined in coordination with the Appropriate Authority and should include the areas that can be visually monitored during the inspections of the manoeuvring area.

(c) Other Areas to be Monitored and Protected: Aeronautical communications, navigation and surveillance systems should be established and protected in accordance with the requirements of ICAO Annex 10.

AMC1 ADR.OPS.075(g) Safeguarding of aerodrome and surrounding

AREAS WITHIN WHICH A NON-AERONAUTICAL LIGHT MAY CAUSE CONFUSION

A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights should be extinguished, screened or otherwise modified so as to eliminate such a possibility. In particular, attention should be directed to a non-aeronautical ground light visible from the air within the areas described hereunder:

(a) Instrument runway – Code number 4

within the areas before the threshold and beyond the end of the runway extending at least 4500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.

(b) Instrument runway – Code number 3 or 2

as in a), except that the length should be at least 3 000 m.

(c) Instrument runway – code number 1 or non-instrument runway

within the approach area.



Figure OPS 30: Illustration of lighting protection box for instrument runway, code 4

GM1 ADR.OPS.B.075(g) Safeguarding of aerodrome and surrounding

NON-AERONAUTICAL LIGHTS

(a) Lights that have potential to cause safety problems include, but not limited to, the following:

(1) temporary lighting (e.g.: construction lights, light shows);

(2) advertisements (e.g.: display screens, lit hoardings);

(3) lighting of building and other structures;

(4) street lights;

(5) flood lights (e.g.: sports venue).

(b) To avoid confusion with aeronautical ground lights, any proposed lighting in the vicinity of the aerodromes, replicating the same pattern or colour of the aeronautical lighting should be avoided. Street and car park lights should be full cut off and mounted so that light is not emitted above the horizon.

(c) Any developments, especially those close to the approach and take off surfaces should not display high levels of lighting as this would diminish the effectiveness of the aeronautical lights.

AMC1 ADR.OPS.B.075(h) Safeguarding of aerodrome and surrounding

OPERATIONS OF OUTDOOR LASER

(a) To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones shall be established around aerodromes:

(1) a laser-beam free flight zone (LFFZ);

(2) a laser-beam critical flight zone (LCFZ); and

(3) a laser-beam sensitive flight zone (LSFZ).

(b) The restrictions on the use of laser beams in the three protected flight zones, LFFZ, LCFZ and LSFZ, refer to visible laser beams only. Laser emitters operated by the authorities in a manner compatible with flight safety are excluded. In all navigable airspace, the irradiance level of any laser beam, visible or invisible, is expected to be less than or equal to the maximum permissible exposure (MPE) unless such emission has been notified to the authority and permission obtained.

(c) Figures OPS 31, OPS 32, OPS 33 can be used to determine the exposure levels and distances that adequately protect flight operations.

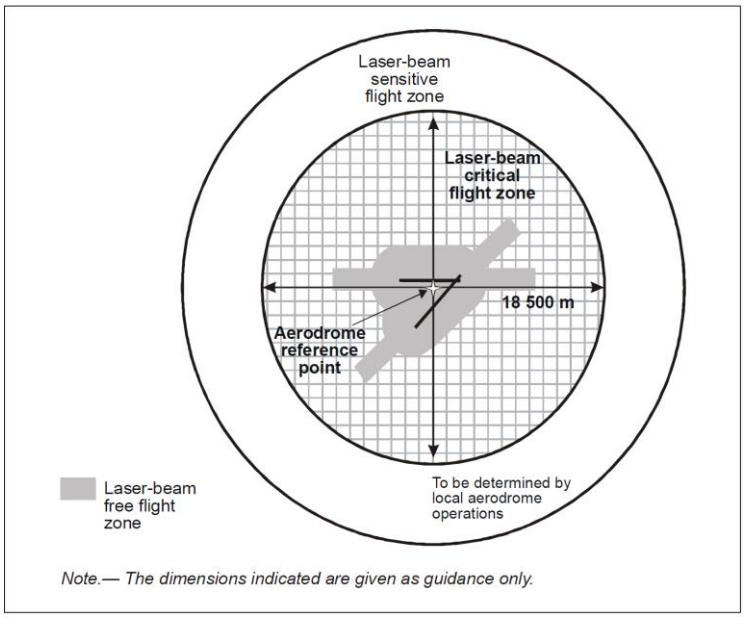


Figure OPS 31: Protected flight zones

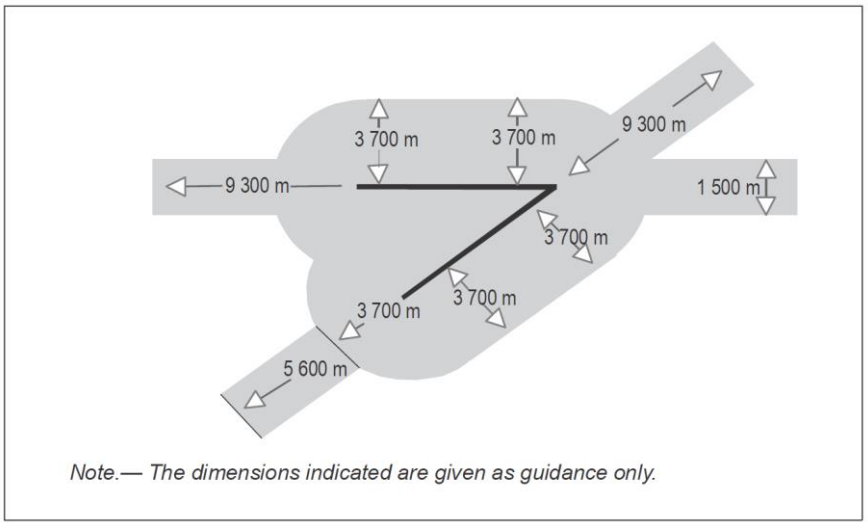


Figure OPS 32: Multiple runway laser-beam free flight zone

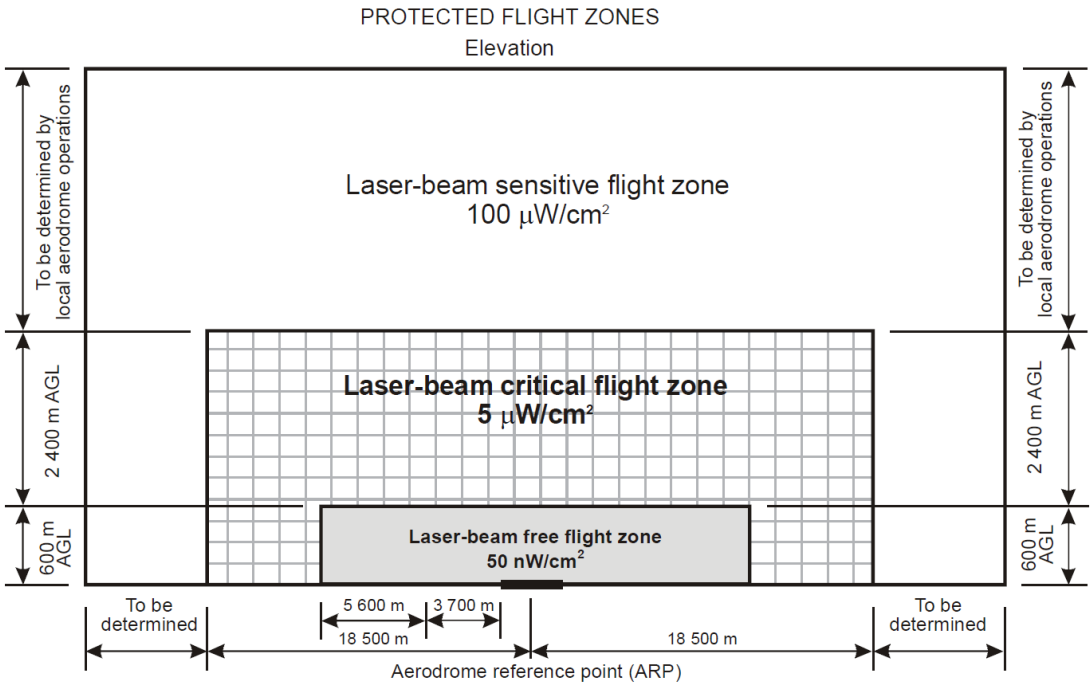


Figure OPS 33: Protected flight zone with indication of maximum irradiance levels for visible laser beam

GM1 ADR.OPS.B.075(g) Safeguarding of aerodrome and surrounding

To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones should be established around aerodromes:

Geographical Identification of hazard from Aerodrome Reference Point	
A laser-beam free flight zone (LFFZ) Within this zone, the intensity of laser light should be restricted to a level that is unlikely to cause any visual disruption. The irradiance should not exceed 50 $\mu W/cm^2$ unless some form of mitigation is applied. The level of brightness thus produced is indistinguishable from background ambient light.	within 3 Nautical Miles (5.5 kilometers)
A laser-beam critical flight zone (LCFZ) Within this zone the irradiance should not exceed 5 $\mu W/cm^2$ unless some form of mitigation is applied. Although capable of causing glare effects, this irradiance will not produce a level of brightness sufficient to cause flash-blindness or after-image effects. Note :This zone may have to be adjusted to meet air traffic requirements.	within 10 Nautical Miles (18.5 kilometers) radius of the extended runway centerline.
A laser-beam sensitive flight zone (LSFZ) Within this zone the irradiance should not exceed 100 $\mu W/cm^2$ unless some form of mitigation is applied. The level of brightness thus produced may begin to produce flash-blindness or after-image effects of short duration; however, this limit will provide protection from serious effects.	beyond than 10 NM

Normal Flight Zone

The NFZ is any navigable airspace not defined as LFFZ, LCFZ or LSFZ. The NFZ should be protected from laser radiation capable of causing biological damage to the eye.

The maximum irradiance level (MIL), should be equal to or less than the maximum permissible exposure (MPE).

AMC1 ADR.OPS.075(a)3 Safeguarding of aerodrome and surrounding

Aerodrome operators should ensure or coordinate through arrangement with the appropriate authority the that any lasers beam not aimed in the aircraft direction, and/or that the times of operation are controlled, to ensure no hazard is posed to aircraft operations.

GM1 ADR.OPS.075(a)3 Safeguarding of aerodrome and surrounding

(a) In case of LASER attack reported, coordinate with the local police to establish the most expeditious reaction to such events and provide them with a detailed report to assist in locating the source of the laser in order to enforce stopping of such hazard.

(b) Advise AIS to issue cautionary NOTAM in case of repeated exposure.

~~(c)~~ Additionally, Aerodrome should monitor the laser-beam free flight zone as part of aerodrome serviceability inspections.

AMC1 ADR.OPS.075(b)(2); Safeguarding of aerodrome and surrounding

WARNING NOTICES

Where low flying aircraft, at or near an aerodrome, or taxiing aircraft are likely to be hazardous to people or vehicular traffic, the Aerodrome Operator shall:

(a) Post notices warning of the hazard on any public way that is adjacent to the manoeuvring area; or

(b) If such a public way is not controlled by the aerodrome operator, inform the authority responsible for posting the notices on the public way that there is a hazard.

ADR.OPS.B.080 Marking and lighting of vehicle and other mobile objects

The aerodrome operator shall ensure that vehicles and other mobile objects, excluding aircraft, on the movement area of the aerodrome are:

(1) marked by use of conspicuous colours, or display, at suitable locations, flags of appropriate size, chequered pattern and contrasting colours;

(2) lighted with low-intensity obstacle lights whose type and characteristics are appropriate to their function, if the vehicles and the aerodrome are used at night or in conditions of low visibility. The colour of the lights to be displayed shall be as follows:

(a) flashing blue for vehicles associated with emergency or security;

(b) flashing yellow for other vehicles, including follow-me vehicles;

(c) fixed red for objects with limited mobility.

AMC1 ADR.OPS.B.080(a) Marking and lighting of mobile objects

MARKING OF VEHICLES

(a) Mobile objects to be marked should be coloured or display flags as follows:

(1) red or yellowish green colour should preferably be used for marking emergency vehicles and yellow colour for service vehicles;

(2) When flags are used to mark vehicles, they should:

(i) be displayed around, on top of, or around the highest edge of the vehicle. Flags should not increase the hazard presented by the vehicle they mark;

(ii) not be less than 0.9 m on each side and should consist of a chequered pattern, each square having sides of not less than 0.3 m. The colours of the pattern should contrast each other and with the background against which they will be seen. Orange and white, or alternatively red and white should be used, except where such colours merge with the background.

LIGHTING OF MOBILE OBJECTS

(a) Lighting of mobile objects should be as follows:

(1) low-intensity obstacle lights, Type C, should be displayed on vehicles;

(2) low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security should be flashing blue and those displayed on other vehicles should be flashing yellow;

(3) low-intensity obstacle lights, Type D, should be displayed on follow-me vehicles.

(b) Low-intensity obstacle lights, Types C and D should be in accordance with the specifications contained in Table CS-61, CS ADR-DSN.U.930 and Figure U-1A or U-1B of CS-ADR-DSN, as appropriate.

ADR.OPS.B.090 Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

(a) Except for emergency situations, an aerodrome operator shall, subject to the prior approval by the GCAA, permit the use of aerodrome or parts thereof by aircraft exceeding the certified design characteristics of the aerodrome. (higher code letter than the aerodrome design character specified in terms of the certificate).

(b) When the aerodrome accommodates an aircraft that exceeds the certificated characteristics of the aerodrome, the compatibility between the operation of the aircraft and aerodrome infrastructure and operations shall be assessed and appropriate measures developed and implemented in order

to maintain an acceptable level of safety during operations. aircraft operational characteristics should be included in the evaluation process. The operational characteristics can include the infrastructure requirements of the aircraft as well as ground servicing requirements.

(c) The proposals for operations on runways which are less than the required code (eg. Code F operations on a Code E runway) shall be supported by an aeronautical Study with a statement of the limited use.

(d) Information concerning alternative measures, operational procedures and operating restrictions implemented at an aerodrome arising from (b) shall be promulgated.

AMC1 ADR.OPS.B.090 Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

GENERAL - INSPECTIONS

Pre and Post operations of higher code aircraft- a programme of inspections should be implemented to confirm continuing serviceability and ensure that there is no deterioration of surface that could create a risk of FOD or other hazards to aircraft operations.

AMC1 ADR.OPS.B.090(b) Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

ELEMENTS TO BE ASSESSED

Aeronautical study should include, but are not limited to:

(a) the aircraft mass, tire pressure and ACR values — with regard to overload operations;

(b) maximum passenger and fuel carrying capacity — with regard to level of RFFS protection to be provided and the aerodrome emergency planning;

(c) when assessing the possibility of operation of aircraft whose code letter is higher than the code letter of the aerodrome reference code, the aerodrome operator should, amongst other issues, assess the impact of the characteristics of the aircraft on the aerodrome, its facilities, equipment and its operation, and vice versa;

(d) aircraft characteristics to be assessed include, but are not limited to:

(1) fuselage length

(i) the dimensions of the movement area (taxiway, holding bays and aprons), passenger gates and terminal areas;

(ii) the aerodrome category for RFF;

(iii) ground movement and control (e.g. reduced clearance behind a longer aeroplane holding at an apron or a runway/intermediate holding position to permit the passing of another aeroplane); and

(iv) clearances at the aircraft stand.

(2) fuselage width

the fuselage width is used to determine the aerodrome category for RFF.

(3) fuselage height;

(4) door sill height

(i) the door sill height may have an impact on:

(ii) the operational limits of the air bridges;

(iii) mobile steps;

(iv) catering trucks;

(v) persons with reduced mobility; and

(vi) dimensions of the apron.

(5) aeroplane nose characteristics

the aeroplane nose characteristics may have an impact on the location of the runway-holding position of the aeroplane which should not infringe the OFZ.

(6) tail height

the tail height may have an impact on:

(i) the location of the runway-holding position;

(ii) ILS critical and sensitive areas: In addition to the tail height of the critical aeroplane, tail composition, tail position, fuselage height and length can have an effect on ILS critical and sensitive areas;

(iii) the dimensions of aeroplane maintenance services;

(iv) aeroplane parking position (in relation to aerodrome OLS);

(v) runway/parallel taxiway separation distances; and

(vi) the clearance of any aerodrome infrastructure or facilities built over stationary or moving aeroplanes.

(7) wingspan;

The wingspan may have an impact on:

(i) taxiway/taxilane separation distances (including runway/taxiway separation distances);

(ii) the dimensions of the OFZ;

(iii) the location of the runway-holding position (due to the impact of the wingspan on OFZ dimensions);

(iv) the dimensions of aprons and holding bays;

(v) wake turbulence;

(vi) gate selection;

(vii) aerodrome maintenance services around the aeroplane; and

(viii) equipment for disabled aeroplane removal.

In the case of an aeroplane equipped with folding wing tips, its reference code letter may change as a result of the folding/extending of the wing tips. Consideration should be given to the wingspan configuration and resultant operations of the aeroplane at an aerodrome.

(8) wing tip vertical clearance

The wing tip vertical clearance may have an impact on:

(i) taxiway separation distances with height-limited objects;

(ii) apron and holding bay clearances with height-limited objects;

(iii) aerodrome maintenance services;

(iv) airfield signage clearances; and

(v) service road locations.

(9) cockpit view

The relevant geometric parameters to assess the cockpit view are cockpit height, cockpit cut-

off angle and the corresponding obscured segment. The cockpit view may have an impact on:

(i) runway visual references (aiming point);

(ii) runway sight distance;

(iii) taxiing operations on straight and curved sections;

(iv) markings and signs on runways, turn pads, taxiways, aprons and holding bays;

(v) lights: in low visibility conditions, the number and spacing of visible lights when taxiing may depend on the cockpit view; and

(vi) calibration of PAPI/VASIS (pilot eye height above wheel height on approach).

Note.— Cockpit view with reference to the obscured segment is also affected by the attitude of the aeroplane on approach.

(10) distance from the pilot's eye position to the nose landing gear and to the main landing gear

the design of taxiway curves is based on the cockpit-over-centre-line concept. The distance from the pilot's eye position to the nose landing gear is relevant for:

(i) taxiway fillets (wheel track);

(ii) the dimensions of aprons and holding bays; and

(iii) the dimensions of turn pads.

(11) outer main gear wheel span

The outer main gear wheel span may have an impact on:

(i) runway width;

(ii) the dimensions of turn pads;

(iii) taxiway width;

(iv) taxiway fillets;

(v) the dimensions of aprons and holding bays; and

(vi) the dimension of the OFZ.

(12) landing gear design

The aeroplane landing gear design is such that the overall mass of the aeroplane is

distributed so that the stresses transferred to the base material through a well-designed pavement are within the bearing capacity of the base course. The landing gear layout also has an effect on the maneuverability of the aeroplane and the aerodrome pavement system.

(13) wheelbase

The wheelbase may have an impact on:

(i) the dimensions of turn pads;

(ii) taxiway fillets;

(iii) the dimensions of aprons and holding bays; and

(iv) terminal areas and aeroplane stands.

(14) gear steering system

the gear steering system may have an impact on the dimensions of turn pads and the dimensions of aprons and holding bays.

(15) landing gear geometry

landing gear geometry, tire pressure and ACR values may have an impact on the airfield pavement and associated shoulders.

(16) engine characteristics

the engine characteristics include engine geometry and engine airflow characteristics, which may affect aerodrome infrastructure as well as ground handling of the aeroplane and operations in adjacent areas which are likely to become affected by jet blast.

The engine geometry aspects are:

(i) the number of engines;

(ii) the location of engines (span and length);

(iii) the vertical clearance of engines; and

(iv) the vertical and horizontal extent of possible jet blast or propeller wash.

Engine airflow characteristics are:

(i) idle, breakaway and take-off thrust exhaust velocities;

(ii) thrust reverser fitment and flow patterns; and

(iii) inlet suction effects at ground level.

The engine characteristics may be relevant for the following aerodrome infrastructure and operational aspects:

(i) runway shoulder width and composition (jet blast and ingestion issues during take-off and landing);

(ii) shoulder width and composition of runway turn pads;

(iii) taxiway shoulder width and composition (jet blast and ingestion issues during taxiing);

(iv) bridge width (jet blast under the bridge);

(v) the dimensions and location of blast protection fences;

(vi) the location and structural strength of signs;

(vii) the characteristics of runway and taxiway edge lights;

(viii) the separation between aeroplanes and adjacent ground service personnel, vehicles or passengers;

(ix) the design of engine run-up areas and holding bays;

(x) the design and use of functional areas adjacent to the manoeuvring area;

(xi) the design of air bridges; and

(xii) the location of refuelling pits on the aircraft stand.

(17) ACR-PCR compatibility / overload operations;

(18) maximum passenger- and fuel-carrying capacity

Maximum passenger- and fuel-carrying capacity may have an impact on:

(i) terminal facilities;

(ii) fuel storage and distribution;

(iii) aerodrome emergency planning;

(iv) aerodrome rescue and fire fighting; and

(v) air bridge loading configuration.

(19) flight performance

flight performance may have an impact on:

(i) runway width;

(ii) runway length;

(iii) the OFZ;

(iv) runway/taxiway separation;

(v) wake turbulence;

(vi) noise; and

(vii) aiming point marking.

(20) technology evolution.

(viii) Remotely piloted aircraft system;

(ix) Alternate power such as electrical , sustainable aviation fuel, etc.

(e) The following list of aeroplane ground servicing characteristics and requirements may affect the available aerodrome infrastructure. This list is not exhaustive; additional items may be identified by the stakeholders involved in the compatibility assessment process:

(1) ground power;
(2) passengers embarking and disembarking;
(3) cargo loading and unloading;
(4) fuelling and charging
(5) pushback and towing;
(6) taxiing and marshalling;
(7) aeroplane maintenance;
(8) ARFF;
(9) equipment areas;
(10) stand allocation; and
(11) disabled aircraft removal.

AMC2 ADR.OPS.B.090(b) Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

Following procedure should be included in the aerodrome compatibility study:

(a) identify the aeroplane's physical and operational characteristics;

(b) identify the applicable regulatory requirements;

(c) establish the adequacy of the aerodrome infrastructure and facilities vis-à-vis the requirements of the new aircraft;

(d) identify the changes required to the aerodrome;

(e) document the compatibility study; and

(f) perform the required safety assessments identified during the compatibility study.

Note : A compatibility study may require a review of the obstacle limitation surfaces at an aerodrome.

GM ADR.OPS.B.090 Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

EMERGENCY SITUATION

(a) An emergency situation is one in which the safety of the aircraft or of persons on board or on the ground is endangered for any reason.

(b) An emergency or abnormal situation may result in it being impossible to continue the flight to destination as planned.

GM1 ADR.OPS.B.090(b) Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

ELEMENTS TO BE ASSESSED

Further guidance on this issue is contained in ICAO Circular 305-AN/177 and ICAO Circular 301- AN/174.

GM2 ADR.OPS.B.090 (b) Use of aerodrome by aircraft exceeding the certified design characteristics of the aerodrome

GENERAL

(a) A compatibility study should be performed collaboratively between affected stakeholders, which includes the aerodrome operator, the aeroplane operator, and ground handling agencies as well as the various air navigation service providers (ANSPs) whenever introducing an aeroplane type/model new to the aerodrome irrespective of the size of the aeroplane.

(b) The following steps describe the arrangement, to be appropriately documented, between the aeroplane operator and aerodrome operator for the introduction of an aeroplane type/subtype new to the aerodrome:

(1) the aeroplane operator submits a request to the aerodrome operator to operate an aeroplane type/subtype new to the aerodrome;

(2) the aerodrome operator identifies possible means of accommodating the aeroplane type/subtype including access to movement areas and, if necessary, considers the feasibility and economic viability of upgrading the aerodrome infrastructure; and

(3) the aerodrome operator and aircraft operator discuss the aerodrome operator's assessment, and whether operations of the aeroplane type/subtype can be accommodated and, if permitted, under what conditions.

(c) Following the outcome of a compatibility study, an aeronautical study should be performed if the impact of the proposed changes involves deviations to CAR AGA, CAR ACM and present alternative mean of compliance that is acceptable to the GCAA.

ADR.OPS.B.100 Aeronautical studies

(a) An aerodrome operator shall monitor operations and conduct an Aeronautical study prior to a significant change that may affect the safety of aerodrome operations.

(b) An aerodrome operator shall conduct an Aeronautical study where referred to by this regulation.

(c) An Aeronautical study shall be conducted to assess the impact of proposed change or deviations to Civil Aviation Regulations; present alternative means of ensuring safety of aircraft operations; assess the effectiveness of each alternative or proposed change and to recommend procedures or mitigating measures to compensate for any safety risks that have been identified.

(d) As part of its management system, the aerodrome operator proposing a change to the aerodrome, its operation, its organisation, its management system, equipment or proposing a deviation from Civil Aviation Regulation shall:

(1) determine the interdependencies with any affected parties, plan and conduct an aeronautical study in coordination with these organisations;

(2) align assumptions and mitigations with any affected parties, in a systematic way;

(3) ensure a comprehensive assessment of the change including any necessary interactions; and

(4) ensure that complete and valid arguments, evidence and safety criteria are established and documented to support the aeronautical study, and that the change supports the improvement of safety whenever reasonably practicable.

AMC1 ADR.OPS.B.100(d) Aeronautical Studies

GENERAL

(a) When a safety concern, change or a deviation has an impact on several aerodrome stakeholders, consideration should be given to the involvement of all stakeholders affected in the safety assessment process. In some cases, the stakeholders impacted by the change will need to conduct a separate safety assessment themselves in order to fulfil the requirements of their SMS and coordinate with other relevant stakeholders.

(b) When a change has an impact on multiple stakeholders, a collaborative safety assessment should be conducted to ensure compatibility of the final solutions.

GM2 ADR.OPS.B.100(d) Aeronautical Studies

APPLICABILITY

The following listing contains examples where an Aeronautical Study is required. Aerodrome Operators should consider additional circumstances where it may be applicable and beneficial to conduct an Aeronautical Study, which may be dependent upon the level and scale of operations:

(a) where prior approval is required for proposals for operations on runways which are less than the required code (i.e. Code F operations on a Code E runway);

(b) where it is proposed to operate with lower taxiway minimum separation distances at an existing aerodrome, than that required by these regulations;

(c) where it is proposed to omit a location sign, which is required by these regulations to be provided in conjunction with a direction sign;

(d) where new or extensions of existing obstacles should not be permitted above an obstacle protection surface or obstacle limitation surface, as referred to by regulation unless it is determined that the object would not adversely affect safety;

(e) where the presence of objects must be lighted with reference to these regulations.

(f) where the wheel clearance over the threshold does not meet the requirements for the installation for a PAPI and APAPI;

(g) where there are changes to any obstacles, developments and other activities within the areas monitored by the Aerodrome Operator in accordance with regulation, which may endanger safety and adversely affect the operation of an aerodrome;

(h) An aeronautical study should be applied to examine the impact of obstacles at and in the vicinity of the new airport at the master planning stage.

GM3 ADR.OPS.B.100(d) Aeronautical Studies

ASSESSMENT PROCESS

The assessment process should include:

(a) identification of the scope of the change;

(b) identification of hazards;

(c) determination of the safety criteria applicable to the change;

(d) risk assessment in relation to the harmful effects or improvements in safety related to the change;

(e) risk evaluation and, if required, risk mitigation for the change to meet the applicable safety criteria;

(f) verification that the change conforms to the scope that was subject to safety assessment, and meets the safety criteria, before the change is put into operation;

(g) the specification of the monitoring requirements necessary to ensure that the aerodrome and its operation will continue to meet the safety criteria after the change has taken place;

(h) consideration of the impact of the safety concern on all relevant factors determined to be safety-significant. The list below provides a number of items that may need to be considered when conducting a safety assessment. The items in this list are not exhaustive and in no particular order:

(1) aerodrome layout, including runway configurations; runway length; taxiway, taxilane and apron configurations; gates; jet bridges; visual aids; and the RFF services infrastructure and capabilities;

(2) types of aircraft, and their dimensions and performance characteristics, intended to operate at the aerodrome;

(3) traffic density and distribution;

(4) aerodrome ground services;

(5) air-ground communications and time parameters for voice and data link communications;

(6) type and capabilities of surveillance systems and the availability of systems providing controller support and alert functions;

(7) flight instrument procedures and related aerodrome equipment;

(8) complex operational procedures, such as collaborative decision-making (CDM);

(9) aerodrome technical installations, such as advanced surface movement guidance and control systems (A-SMGCS) or other air navigation aids;

(10) obstacles or hazardous activities at or in the vicinity of the aerodrome;

(11) planned construction or maintenance works at or in the vicinity of the aerodrome;

(12) any local or regional hazardous meteorological conditions (such as wind shear); and

(13) airspace complexity, ATS route structure and classification of the airspace, which may change the pattern of operations or the capacity of the same airspace.

SCOPE

The scope of the Aeronautical Study should include the following elements and their interaction:

(a) the aerodrome, its operation, management, and human elements being changed or introduced;

(b) interfaces and interactions between the elements being changed or introduced and the remainder of the system;

(c) interfaces and interactions between the elements being changed or introduced and the environment in which it is intended to operate; and

(d) the full lifecycle of the change or introduction of systems, procedures, equipment from definition to operations.

SAFETY CRITERIA

(a) The safety criteria used should be defined in accordance with the procedures for the management of change contained in the Aerodrome Manual;

(b) The safety criteria used should, depending on the availability of data, be specified with reference to explicit quantitative acceptable safety risk levels, recognised standards, and/or codes of practice, the safety performance of the existing system, or a similar system.

SUPPORTING EVIDENCE

(a) As a minimum, the Aeronautical Study should include supporting evidence, safety assessments, actions, exercises to demonstrate compliance, compliance statements, inspections, tests, results from the risk management process (hazard identification, and risk assessment and mitigation processes) and aerodrome management accountability.

(b) An Aeronautical Study will only be approved (where applicable) on the basis of a robust rationale. Therefore, aeronautical study techniques should be developed, as part of a Safety Management System (SMS), at the appropriate level.

(c) The responsibility for justifying, either qualitatively or quantitatively, an alternative means of compliance lies with the Aerodrome Operator.

SECTION C — AERODROME MAINTENANCE (ADR.OPS.C)

ADR.OPS.C.005 Maintenance

(a) The aerodrome operator shall establish and implement a maintenance programme, which includes preventive maintenance where appropriate, to maintain aerodrome facilities, systems and equipment necessary for the operation of the aerodrome in a condition which does not impair the safety, regularity or efficiency of air navigation.

(b) The design and implementation of the maintenance programme shall observe human factors principles.

(c) The Aerodrome Operator shall ensure that all maintenance records are documented, including information on the design and construction of aerodrome pavements and aerodrome lighting. A system for easy retrieval of such documentation shall be implemented.

(d) The Aerodrome Operator shall ensure that appropriate and adequate means are provided for the effective implementation of the maintenance programme.

(e) An Aerodrome Operator, who operates and maintains radio navigation aids, shall do so in accordance with the requirements of the CAR ANS, Part CNS.

AMC1 ADR.OPS.C.005(a) Maintenance

MAINTENANCE PROGRAMME

(a) The aerodrome operator should ensure that the maintenance programme:

(1) specifies the aerodrome facilities, systems, installations and equipment subject to maintenance;

(2) contains the necessary information for its timely and correct implementation including but not limited to:

(i) the type of inspections/checks to be carried out (e.g. visual inspection, cleaning of equipment, equipment stability/alignment, calibration, etc.) for each facility, system, installation and equipment, taking also into account factors such as their location and meteorological phenomena;

(ii) the frequency of inspections/checks for each facility, system, installation and equipment;

(iii) the tools and equipment required for each type of inspection/check; and

(iv) the periodic replacement of parts that may be required in accordance with the maintenance instructions of the manufacturer of the respective facility, system, installation and equipment, as appropriate.

(b) The aerodrome operator should ensure that arrangements are in place for timely corrective maintenance actions. Such arrangements should cover the cases of maintenance needs that are:

(1) identified either during preventive maintenance activities; or

(2) raised at any other time (e.g. due to equipment malfunction or failure).

AMC1 ADR.OPS.C.005(e) Maintenance

The aerodrome operator should

(a) Prevent the construction of facilities on the aerodrome that would adversely affect the operation of any electronic or visual navigation aid or air traffic service facility on the aerodrome; and

(b) Prevent, as far as it is within the Aerodrome Operator's authority, any interruption of visual or electronic signals of navigation aids.

GM1 ADR.OPS.C.005(a) Maintenance

MAINTENANCE PROGRAMME

(a) The maintenance programme also includes maintenance of communication and alerting systems, fences and access control devices, perimeter roads and lighting, passenger boarding bridges, etc.

(b) Preventive maintenance is programmed maintenance work done in order to prevent a failure or degradation of facilities.

(c) "Facilities" are intended to include such items as pavements, visual aids, fencing, drainage systems, electrical systems and buildings.

(d) Guidance material on human factors principles can be found in the Human Factors Training Manual (Doc 9683) and in the Airport Services Manual (Doc 9137), Part 8.

(e) General principles and procedures on the training of aerodrome personnel, including training programmes and competence checks, are specified in the PANS-Aerodromes (Doc 9981).

ADR.OPS.C.007 Maintenance of vehicles

(a) The aerodrome operator shall:

(1) establish and implement a maintenance programme, which includes preventive maintenance and observes human factors principles, for rescue and firefighting vehicles, to

ensure effectiveness of the vehicles and their equipment and compliance with the specified response time throughout the life of the vehicle;

(2) ensure the implementation of a maintenance programme for its other vehicles that operate on the movement area or other operational areas.

(b) The aerodrome operator shall:

(1) establish procedures to support the implementation of the maintenance programme referred to in point (a);

(2) ensure that appropriate and adequate means and facilities are provided for its effective implementation;

(3) keep maintenance records for each vehicle.

(c) The aerodrome operator shall ensure that organisations that operate or provide services at the aerodrome:

(1) maintain their vehicles that operate on the movement area or other operational areas, in accordance with an established maintenance programme, including preventive maintenance;

(2) keep relevant maintenance records.

(d) The aerodrome operator shall ensure that unserviceable vehicles are not used for operations.

AMC1 ADR.OPS.C.007(a) Maintenance of vehicles

MAINTENANCE OF VEHICLES — GENERAL

The maintenance of the vehicles may be performed by the aerodrome operator or by a contracted organisation. The maintenance programme should be individual for each vehicle, depending on its function and characteristics. The maintenance programme should take into account the following:

(a) regulatory requirements (e.g. certification of pressure vessels, hoses, roadworthiness certificates);

(b) the manufacturer's maintenance recommendations;

(c) local environmental conditions (e.g. heat versus cold winters);

(d) the need to ensure the serviceability of the equipment installed on the vehicle (e.g. radio, transponders or equivalent systems); and

(e) regular performance test results, if appropriate.

AMC1 ADR.OPS.C.007(a)(1) Maintenance of vehicles

PREVENTIVE MAINTENANCE

(a) As part of the preventive maintenance programme, the aerodrome operator should determine the items that need to be checked daily, prior to the operation of the vehicle. As a minimum, the following items should be checked on a daily basis, prior to the operation of a vehicle:

(1) malfunction/warning indications;

(2) steering wheel;

(3) lighting system;

(4) braking system;

(5) communication systems, including transponder (or equivalent) if applicable;

(6) tyre condition;

(7) external mirrors;

(8) windscreen wipers (as appropriate);

(9) items that need to be secured on the vehicle;

(10) leaks; and

(11) new external damages to the vehicle.

(b) A feedback mechanism should be established to ensure that any defects identified are communicated to the unit responsible for the maintenance of the vehicle.

GM1 ADR.OPS.C.007(a)(2) Maintenance of vehicles

As part of the maintenance programme for all its other vehicles, the aerodrome operator may, in the interest of safety, determine the items that need to be checked daily prior to their use, and communicate any defects identified during such checks to the unit responsible for the maintenance of the vehicle.

GM1 ADR.OPS.C.007(b)(1) Maintenance of vehicles

MAINTENANCE PROCEDURES — GENERAL

Maintenance procedures should be established to ensure a standardised manner in which vehicles are maintained and should cover as a minimum:

(a) activities to be undertaken to ensure that disruption to aerodrome services (e.g. RFFS) is minimised;

(b) the frequency of maintenance services;

(c) activities to be undertaken at each type of maintenance service (e.g. visual check, inspections, measurements, etc.);

(d) arrangements for technical support from the manufacturer;

(e) spare parts that should be kept on site;

(f) procedures to ensure the safety of maintenance personnel;

(g) environmental procedures, including appropriate disposal procedures for old parts, and other material; and

(h) documentation and reporting of any defects that have been identified by operational and/or maintenance personnel.

GM1 ADR.OPS.C.007(b)(3) Maintenance of vehicles

MAINTENANCE RECORDS

The maintenance records, as a minimum, should include the following:

(a) maintenance type (preventive/corrective);

(b) items checked/repaired;

(c) maintenance date (entry/exit date to/from the workshop); and

(d) name of the person that conducted the inspection/repair.

GM1 ADR.OPS.C.007(d) Maintenance of vehicles

UNINTENDED USE OF UNSERVICEABLE VEHICLES

Apart from the obligation to ensure that an unserviceable vehicle is removed from operations, measures also need to be taken to avoid the unintended use of an unserviceable vehicle. The latter may include the placing of a warning placard inside the vehicle to inform about the unserviceability of the vehicle, and the establishment of a method for the provision of such information to the relevant personnel, especially those of the next shift.

ADR.OPS.C.010 Maintenance of pavements, other ground surfaces and drainage

(a) The aerodrome operator shall inspect the surfaces of all movement areas including pavements (runways, taxiways and aprons), adjacent areas and drainage to regularly assess their condition as part of an aerodrome preventive and corrective maintenance programme.

(b) The aerodrome operator shall:

(1) maintain the surfaces of all movement areas with the objective of avoiding and eliminating any FOD that might cause damage to aircraft or impair the operation of aircraft systems;

(2) maintain the surface of runways, taxiways and aprons in order to prevent the formation of harmful irregularities;

(3) maintain the runway in a condition so as to provide surface friction characteristics above the minimum standards;

(c) All pavements within the movement area shall be subject to inspection and evaluation by appropriate and competent pavement engineers for the preparation/upkeep of a pavement management system and maintenance schedule. This detailed pavement evaluation shall be undertaken not less than once a year.

(d) When a taxiway is used by jet turbine powered aeroplanes, the surface of the taxiway shoulders should be maintained so as to be free of any loose stones or other objects that could be ingested by the aeroplane engines.

AMC1 ADR.OPS.C.010 Maintenance of pavements, other ground surfaces and drainage

GENERAL

(a) Standing water, mud, dust, sand, oil, rubber deposits, and other contaminants should be removed, as rapidly and completely as possible, to minimise accumulation.

(b) Taxiways should be kept clear of contaminants to the extent necessary to enable aircraft to be taxied to and from an operational runway.

(c) Aprons should be kept clear of contaminants to the extent necessary to enable aircraft to manoeuvre safely or, where appropriate, to be towed or pushed.

(d) Drainage systems and storm water collection systems should be periodically checked and, if necessary cleaned or maintained, to ensure efficient water run-off.

(e) Whenever the clearance of contaminants from the various parts of the Movement Area cannot be carried out simultaneously, the order of priority should be set in consultation with the affected parties such as Aerodrome Emergency Services and documented.

(f) Chemicals which may have harmful effects on aircraft or pavements, or chemicals which may have toxic effects on the aerodrome environment, should not be used.

(g) The surface of a paved runway should be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

(h) Where overload operations are conducted, the aerodrome operator should review the relevant pavement condition regularly, and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life, or require major rehabilitation of pavement.

(i) When a taxiway is used by turbine-engined aeroplanes, the surface of the taxiway shoulders should be maintained so as to be free of any loose stones or other objects that could be ingested by the aeroplane engines.

GM1.OPS.C.010 Maintenance of pavements, other ground surfaces and drainage

(a) Guidance on carrying out daily inspections of the Movement Area is given in, the ICAO Airport Services Manual (Doc 9137), Part 8, the Manual of Surface Movement Guidance and Control

Systems (SMGCS) (Doc 9476) and the ICAO Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (Doc 9830).

(b) Additional guidance on sweeping/cleaning of surfaces is contained in the Airport Services Manual (ICAO Doc 9137), Part 9.

(c) Guidance on precautions to be taken in regard to the surface of shoulders is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.

(d) Where the pavement is used by large aircraft or aircraft with tire pressures in the upper categories particular attention should be given to the integrity of light fittings in the pavement and pavement joints.

GM1 ADR.OPS.C.010(b)(2) Pavements, other ground surfaces and drainage

RUNWAY SURFACE EVENNESS

(a) The operation of aircraft and differential settlement of surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 cm to 3 cm over a 45 m-distance are acceptable, as shown in Figure OPS 34- Roughness criteria. Although maximum acceptable deviations vary with the type and speed of an aircraft, the limits of acceptable surface irregularities can be estimated to a reasonable extent. The following table describes acceptable, tolerable and excessive limits:

Surface Irregularity	Length of irregularity (m)								
	3	6	9	12	15	20	30	45	60
Acceptable surface irregularity height (cm)	2.9	3.8	4.5	5	5.4	5.9	6.5	8.5	10
Tolerable surface irregularity height (cm)	3.9	5.5	6.8	7.8	8.6	9.6	11	13.6	16
Excessive surface irregularity height (cm)	5.8	7.6	9.1	10	10.8	11.9	13.9	17	20

Table OPS 25 : Surface irregularity

(1) If the surface irregularities exceed the heights defined by the acceptable limit curve but are less than the heights defined by the tolerable limit curve, at the specified minimum

acceptable length, herein noted by the tolerable region, then maintenance action should be planned. The runway may remain in service. This region is the start of possible passenger and pilot discomfort.

(2) If the surface irregularities exceed the heights defined by the tolerable limit curve, but are less than the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the excessive region, the maintenance corrective action is mandatory to restore the condition to the acceptable region. The runway may remain in service but should be repaired within a reasonable period. This region could lead to the risk of possible aircraft structural damage due to a single event or fatigue failure over time.

If the surface irregularities exceed the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the unacceptable region, then the area of the runway where the roughness has been identified warrants closure. Repairs are required to restore the condition within the acceptable limit region and the aircraft operators may be advised accordingly. This region runs the extreme risk of a structural failure and must be addressed immediately.

(b) The term 'surface irregularity' is defined herein to mean isolated surface elevation deviations that do not lie along a uniform slope through any given section of a runway. For the purposes of this concern, a 'section of a runway' is defined herein to mean a segment of a runway throughout which a continuing general uphill, downhill, or flat slope is prevalent. The length of this section is generally between 30 and 60 m, and can be greater, depending on the longitudinal profile and the condition of the pavement.

(c) The maximum tolerable step-type bump, such as that which could exist between adjacent slabs, is simply the bump height corresponding to zero bump length at the upper end of the tolerable region of the roughness criteria of Figure OPS 34.

(d) Deformation of the runway with time may also increase the possibility of the formation of water pools. Pools as shallow as approximately 3 mm in depth, particularly if they are located where they are likely to be encountered at high speed by landing aeroplanes, can induce aquaplaning which can then be sustained on a wet runway by a much shallower depth of water. Improved guidance regarding the significant length and depth of pools relative to aquaplaning is the subject of further research.

(e) Macrotexture and microtexture are taken into consideration in order to provide the required

surface friction characteristics. This normally requires some form of special surface treatment.

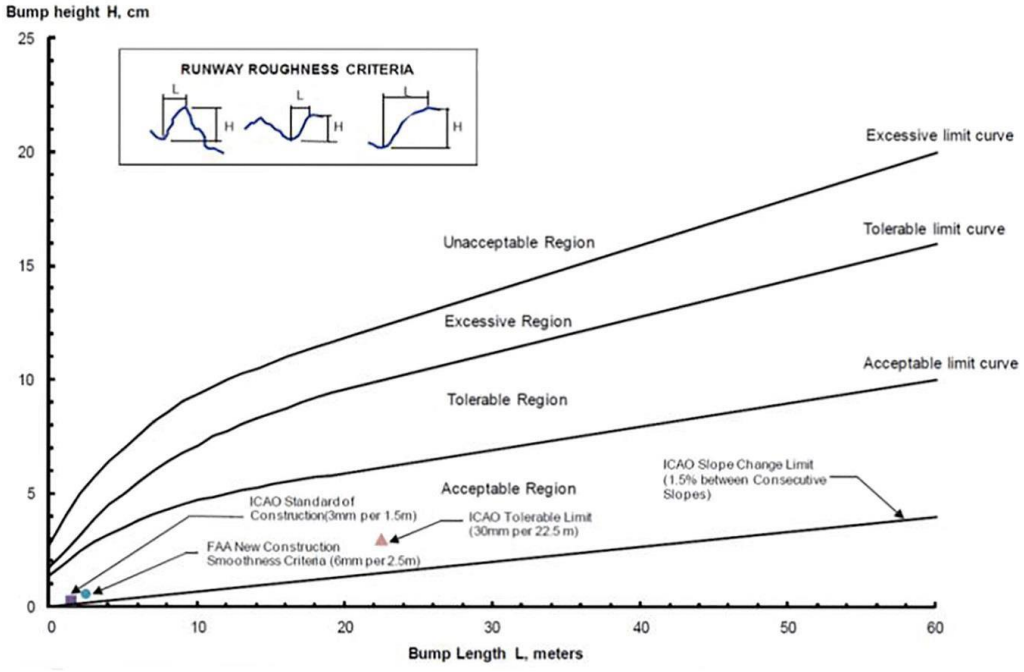


Figure OPS 35 : Roughness criteria

Note: above figure illustrates a comparison of the surface roughness criteria with those developed by the United States Federal Aviation Administration. Further guidance regarding temporary slopes for overlay works on operational runways can be found in the Aerodrome Design Manual, Part 3 — Pavements (Doc 9157).

GM1 ADR.OPS.C.010(b)(3) Pavements, other ground surfaces and drainage

MONITORING OF PHYSICAL PARAMETERS

The following table describes how the physical parameters of the runway surface are monitored

Physical parameter	How to monitor
Microtexture	Presence of microtexture is ensured by touching the pavement surface. If it feels smooth, there is a lack of microtexture, most commonly due to rubber deposits which normally should be visually detectable or by polishing. In either case, the amount of free exposed microtexture should be assessed.

Macrotexture	Can be measured using volumetric or profile measurement method and expressed by ESDU classification. ESDU 15002 groups runways into five classifications labelled A through E with A being the smoothest and E the most heavily textured. The classification can be used to compare the runway texture relevant to the recommended texture depth which is 1.0 mm.
Drainage	Slopes are within the certification specifications. If the slope falls below the minimum values, then the runway becomes more susceptible to standing water during heavy rainfalls.
Ponding	Visually, during and after rain storm events as the runway dries up.
Rutting	Visually, during and after rain storm events. The degree of rutting can be measured using a straight-edge.
Sand and vegetation	Visually during and after rain storm events. Normally, ordinary maintenance activities should prevent sand to accumulate and vegetation to form alongside the runway to such a degree that it becomes a hazard.

Table OPS 26: Monitoring of runway surface physical parameters

ADR.OPS.C.011 Maintenance of pavements – Surface friction assessment and reporting

(a) The aerodrome operators shall:

(1) ensure that paved runway be maintained in a condition so as to provide surface friction characteristics at or above the minimum friction level specified in this CAR;

(2) periodically measure the runway surface friction with a continuous friction measuring device using self-wetting features and records of the same shall be maintained. The frequency of these measurements shall enable to determine the trend of the surface friction characteristics of the runway;

(3) sets out target values, for surface friction levels that should prompt maintenance and/or NOTAM action by aerodrome operators following any such assessment;

(4) take corrective maintenance action to prevent the runway surface friction characteristics for either runway or a portion thereof, when uncontaminated, from falling below the minimum standards;

(5) provide notification to relevant aerodrome users when the friction level of a paved runway or portion thereof is less than the minimum friction level specified in this CAR (subpart- ADR).

(b) when the runway friction characteristics falls below Minimum Friction Level (MFL) a NOTAM shall be issued stating the surface "MAY BE SLIPPERY WHEN WET" and promulgated until remedial action has restored friction values to at least Maintenance Planning Level (MPL);

Note : A portion of runway in the order of 100 m long should be considered significant for maintenance or reporting action;

(c) newly construct and, resurfaced runway shall provide surface friction characteristics at least, above the maintenance planning level set by the GCAA. Measurements of the surface friction characteristics of a new or resurfaced paved runway should be made with a continuous friction measuring device using self-wetting features;

(d) The criteria for friction assessment shall apply to all paved runways with an Accelerate Stop Distance Available (ASDA) 1,200 metres or greater in length. For other runways and runways with ASDA of 1,199m or lesser, the GCAA may, based on reasonable assessment request for runway friction assessments.

GM1.ADR.OPS.C.011 Maintenance of pavements – Surface friction assessment and reporting

GENERAL

(a) Deployment of Continuous Friction Measuring Equipment (CFME) on contaminated runways for the purpose of obtaining friction value readings is not permitted because contaminant drag on the equipment's measuring wheel, amongst other factors, will cause readings obtained in these conditions to be unreliable.

Note: A runway is termed contaminated when water deeper than 3 mm is present over 25% or more of the assessed area;

(b) The surface friction characteristics of a runway or a portion thereof can be degraded due to rubber deposits, surface polishing, poor drainage or other factors. The determination that a runway or portion thereof is slippery wet stems from various methods used solely or in combination. These methods may be functional friction measurements, using a continuous friction measuring device,

that fall below a minimum standard as defined by the GCAA, observations by aerodrome maintenance personnel, repeated reports by pilots and aircraft operators based on flight crew experience, or through analysis of aeroplane stopping performance that indicates a substandard surface.

(c) The surface of a paved runway should be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

(d) When there is reason to believe that the drainage characteristics of a runway, or portions thereof, are poor due to slopes or depressions, then the runway surface friction characteristics should be assessed under natural or simulated conditions that are representative of local rain, and corrective maintenance action should be taken as necessary.

(e) Additionally, in the time taken to pass assessments to pilots, conditions may have changed. Friction value readings must not be passed to aircrew as pilots do not have the means to interpret the readings for the purpose of calculating take-off or landing performance.

(f) The runway surface should be visually assessed, as necessary, under natural or simulated rain conditions for ponding or poor drainage and where required, corrective maintenance action taken.

(g) ICAO Airport Services Manual (Doc 9137), Part 2, contain further information on improving surface friction characteristics of runways.

AMC1 ADR.OPS.C.011(a)(b) Maintenance of pavements – Surface friction assessment and reporting

MAINTENANCE PLANNING AND MINIMUM STANDARDS

(a) When friction measuring devices are used in order to evaluate the condition of the runway surface for maintenance purposes, the maintenance planning and minimum friction levels should be according to the Table OPS 27.

(b) if other friction measuring devices, apart from those mentioned in the Table OPS 28 is used, the aerodrome operator should notify the GCAA with management of change document and evidence the equipment has been correlated with, at least, one test equipment mentioned in the table OPS 27.

(c) Measurements at or below the maintenance planning level should trigger a complete review of the texture, contaminant and drainage state of the affected runway third.

(d) Review should ensure that the runway surface is able to create enough grip by the aeroplane tire to ensure adequate aeroplane stopping and crosswind capability for the desired operation on a wet runway. This is achieved by ensuring that:

(1) exposed texture can indent the tire rubber; and

(2) water drains from the runway pavement.

(e) In order to achieve the objectives of point (c), a review of the surface friction characteristics should, as a minimum, ensure:

(1) the presence of exposed microtexture by touching the aggregates, if the polished or rubber coated extends to 100 m in the zone used by aeroplanes;

(2) the presence of macrotexture;

(3) that grooves, if present, are open and within set limits according to their design;

(4) that porous friction course, if present, drains according to its design; and

(5) that slopes are comply with the requirements in the certification specifications.

Test equipment	Test Speed Km/h	Design objective for new surface (DOL)	Maintenance planning level (MPL)	Minimum Friction level (MFL)
Mu-meter Trailer	65	0.72	0.52	0.42
Skiddometer Trailer		0.82	0.60	0.50
Surface Friction Tester Vehicle		0.82	0.60	0.50
Runway Friction Tester Vehicle		0.82	0.60	0.50
TATRA Friction Tester Vehicle		0.76	0.57	0.48
RUNAR Trailer		0.69	0.52	0.45
GRIPTESTER Trailer		0.74	0.53	0.43

Table OPS 29 : Minimum Friction Level and Maintenance Planning Level(1)

Note : for tire pressure, water depth for testing, refer to the equipment manufacturer's instructions.

GM1.OPS.C.011(a)(b)(c) Maintenance of pavements – Surface friction assessment and reporting

MAINTENANCE PLANNING AND MINIMUM STANDARDS

(a) When friction measuring devices are used in order to evaluate the condition of the runway surface for maintenance purposes, the maintenance planning and minimum friction levels should be according to the following table:

	65 km/h		95km/h	
	Minimum planning	Maintenance	Minimum planning	Maintenance
Airport Surface Friction Tester	0.50	0.60	0.34	0.47
Dynatest Consulting Inc. Dynatest Runway Friction Tester	0.50	0.60	0.41	0.54
Findlay, Irvine, Ltd Griptester Friction Meter	0.43	0.53	0.24	0.36
Halliday Technologies RT3	0.45	0.55	0.42	0.52
Moventor Oy Inc. BV-11 Skiddometer	0.50	0.60	0.34	0.47
Mu Meter	0.42	0.52	0.26	0.38
NAC Dynamic Friction Tester	0.42	0.52	0.28	0.38
Norsemeter RUNAR (operated at fixed 16 % slip)	0.45	0.52	0.32	0.42
Automatic Friction Measuring Device (Instrument de Mesure Automatique de Glissance) – IMAG	0.30	0.40	0.20	0.30

Table OPS 30: Minimum Friction Level and Maintenance Planning Level(2)

(b) When conducting assessments on wet runways, it is important to note that there is very limited variation of the friction reading with speed, a wet runway produces a drop-in friction with an increase in speed. However, as the speed increases, the rate at which the friction is reduced becomes less. Among the factors affecting friction between the tyre and the runway surface, texture is particularly important. If the runway has a good macro- texture (roughness) allowing the

water to escape beneath the tyre, then the friction value will be less affected by speed. Conversely, a low macro-texture (smooth) surface will produce a larger drop in friction as speed increases.

(c) Accordingly, when assessing runways to determine their friction characteristics, and whether maintenance action is necessary to improve it, a speed high enough to reveal these friction/speed variations should be used.

Figure below shows a typical graph to illustrate the variation in friction between textures.

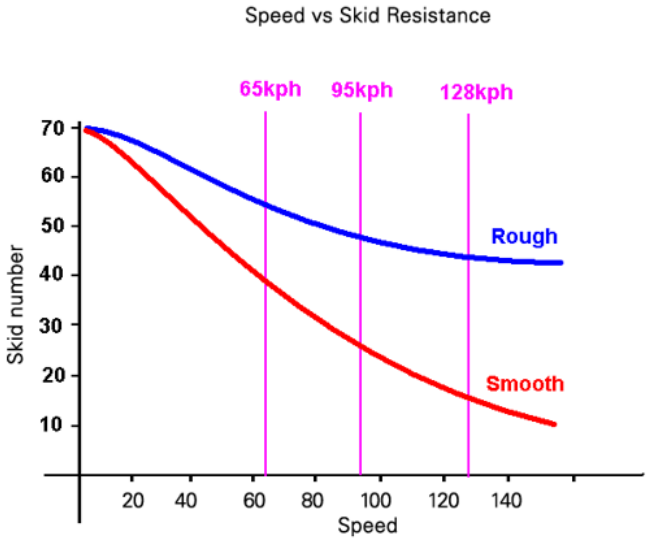


Figure OPS 36: Speed vs Skid resistance

AMC1 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

PERIODIC ASSESSMENTS OF RUNWAY SURFACE FRICTION CHARACTERISTICS

(a) The aerodrome operator when establishing a plan of periodic assessments of runway surface friction characteristics, should take into consideration the number of aircraft movements per runway end, the weight of the aircraft, the type and age of the surface of the runway as well as climatic conditions.

(b) The aerodrome operator should determine the frequency of the assessments that will enable any significant change in runway surface friction characteristics to be identified and, remedial maintenance to be conducted before the friction level falls below the Minimum Friction Level (MFL). The number of inspections should be not less than that mentioned in the table below.

Average number of movements on the Runway per day	Maximum Interval between Assessments
Less than 250	4 months
250 or more	1 month

Table OPS 31: Frequency of friction assessment

(c) Runway surface friction assessment should be conducted following any significant maintenance activity (e.g. surface enrichment course, large scale repairs) conducted on the runway and before the runway is returned to service.

(d) Runway surface friction assessments should also be conducted following pilot reports of perceived poor braking action, if there are visible signs of a buildup of rubber deposits, runway surface wear, or for any other relevant reason.

(e) Notwithstanding (b), the GCAA may request for additional runway friction testing to be conducted.

AMC2 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

TREND MONITORING OF RUNWAY SURFACE FRICTION CHARACTERISTICS

The aerodrome operator should monitor the trend of degradation of runway surface friction characteristics that is caused by but not limited to:

(a) rubber deposits;

(b) surface polishing; and

(c) poor drainage.

GM1 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

TREND MONITORING OF RUNWAY SURFACE FRICTION CHARACTERISTICS

(a) The objective of the trend monitoring programme is to ensure that the surface friction characteristics for the entire runway remain at or above the minimum standards, to avoid the runway becoming slippery wet.

(b) Degradation is typically caused by rubber deposits, surface polishing or poor drainage. These can be mitigated as follows:

(1) Accumulation trend of rubber can be managed through a rubber removal programme;

(2) Polishing trend of the surface can be managed by monitoring loss of sharpness and retexturing/resurfacing programme;

(3) Drainage trend can be managed by monitoring changes in geometry and blocking of drainage channels and reshaping programme.

(c) In the construction of new runways or the resurfacing of existing runways, the construction of surfaces with adequate slopes and aggregate of angular fragments from crushed gravel or stone so as to provide a sharp texture will help to ensure surface friction characteristics providing good braking action in wet conditions. The surface friction characteristics of a new constructed or resurfaced runway surface establish the normal starting point for trend monitoring; however, trend monitoring can also start at any given time through the lifespan of a pavement.

(d) Especially on new surfaces, or resurfaced runways, an aerodrome operator should carry out additional friction testing to establish friction readings during adverse weather conditions and to identify those areas of the runway where contamination (i.e. water) may build up over a short period of time. This is of particular importance where re- profiling of the runway's lateral, longitudinal or sloping planes has been accomplished as part of any rehabilitation project.

(e) The friction characteristics of a runway will vary over time as the runway is subject to wear and tear (polishing), accumulation of rubber deposits and to the effects of weather and other environmental conditions. Aerodrome operators should monitor the results of assessments and should alter the interval between assessments depending on the results. If historical data indicate that the surface is deteriorating relatively quickly, more frequent monitoring may be required in order to ensure that maintenance is arranged before the friction characteristics deteriorate to MFL.

AMC3 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

FRICTION EVALUATIONS WITH CONTINUOUS FRICTION MEASURING DEVICES

The aerodrome operator when conducting friction evaluations with continuous friction measuring device, should:

(a) ensure only trained staff who are competent in equipment’s operation and maintenance and aware of the critical factors affecting the accuracy of friction measurements perform the testing;

(b) ensure that the equipment is in full working order and calibrated in accordance with the manufacturers' operating instructions;

(c) ensure that the equipment is serviced regularly and that the measuring tyre is of the correct specification and remains within manufacturers' tolerance;

(d) The measurements are performed using a self-wetting continuous friction measuring device on a dry runway surface;

(e) adhere to the general guidance on test speeds, nominal test water film thickness, test tyre type, test tyre pressure and test tyre condition provided by the CFME manufacturer;

(f) conduct the friction tests at a distance from the runway centre line as mentioned in the below table, that is representative of the wheel span of the aeroplanes operating on the runway. The aerodrome layout or other circumstances may dictate other distances in order to ensure the personal safety of the operator of the friction measuring device;

Runway Width	Recommended lateral displacement of standard runs on each side of the centerline (metres)					Check runs [b]
	Central portion			Outer portion		
18m	3	5				1m from the RWY side strip marking
23m	3	5	7			
30m	3	6	9			
45m	3	6	9	15		20 m from the centerline
60m	3	6	9	15	25[a]	29m from the centerline

a- by way of derogation from AMC1 ADR.OPS.C.011(a)(2), this run should be carried out every six months to establish trends.

b- Check-runs should be carried out on both sides of the runway centerline and recorded. These are performed before and after standard runs, under the same conditions. Check runs should be performed over the entire pavement length at a constant speed, on a part of the runway that does not traverse any other runs.

Note: Reference to manufacturers' guidelines should be made to determine the maximum variation permissible between the two check runs;

Table OPS 32: Friction testing -lateral displacement of standard runs each on side of the centerline

(g) a standard run should be carried out along the entire pavement length at a constant run test speed, allowing for acceleration and safe deceleration;

(h) The track(s) of the measuring wheel(s) should not run along the line of the pavement joints or longitudinal cracks. Aerodrome operators should ensure that CFME drivers have sufficient means of track keeping whilst engaged in standard runs. This is especially important at night and when conducting runs away from the centerline or edge markings.

GM1.ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

FRICTION EVALUATIONS WITH CONTINUOUS FRICTION MEASURING DEVICES

(a) Where a runway width differs to the above Table OPS 30: Friction testing -lateral displacement of standard runs each on side of the centerline, the standard runs should be as per the next highest width runway.

(b) The run pattern for a runway with Touchdown Zone (TDZ) markings should be planned so as to include one run either side of the centreline to pass through the centre of the painted TDZ markings.

(c) If there is any reason to doubt the accuracy of the runway surface friction assessment, it should be repeated.

(d) On runways without displaced thresholds or paved areas before the start, or beyond the end, of LDA and especially runways near to 1200 m ASDA, operators should ensure that drivers of CFME are equipped with a suitable vehicle that can attain a steady target speed as soon as practicable. A safe method of delineating the braking zone at the end of the run should also be available to the driver to allow safe braking at the end of the run.

(e) The determination of a runway or portion thereof may be slippery when wet is not based solely on the friction measurement obtained using a continuous friction measuring device. Supplementary tools to undertake this assessment are described in the ICAO Airport Services Manual (Doc 9137), Part 2.

GM2 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

FRICTION EVALUATIONS WITH CONTINUOUS FRICTION MEASURING DEVICES

(a) Interpretation of comprehensive self-wetting friction measurements:

(1) The texture of the tyre pavement contact patch area in direct contact with aircraft tyre penetrates the rubber of the aircraft tyre and creates horizontal forces in the aircraft tyre and creates grip. Grip is a micro-movement of the rubber over the texture indenting the rubber. This micro-movement is called slippage. On a free-rolling aircraft tyre, there is no relative movement between the aircraft tyre and the pavement regardless of the rolling speed. The amount of exposed texture, and the quality thereof, both micro and macrotexture, defines the ability of the pavement surface to create wet grip performance of the aircraft tyre;

(2) If the aircraft wheel is braked and the horizontal forces applied on the aircraft tyre are higher than those produced by the grip, the aircraft tyre starts to skid;

(3) The friction coefficient that can be calculated is a dynamic friction coefficient. The dynamic friction coefficient is lower than the static friction coefficient (maximum tyre grip that can be achieved). Related to stopping performance of the aircraft, the operation has become friction-limited when a tyre starts skidding;

(4) The basic assumption for the using a self-wetting continuous friction measuring device with a forced skid is to mirror a braked skidding aircraft tyre on a wet pavement surface. This is an oversimplification since the aircraft tyres are controlled by an anti-skid system and the friction measuring devices operate at a fixed slip;

(5) The measured friction coefficient is a dynamic friction coefficient where the surfaces are forced to be in relative motion regardless of the measuring speed. The degree of relative motion is friction measuring device-specific;

(6) The measured value is an indication of the overall texture, contaminant and drainage capability of the pavement surface in the tyre pavement contact patch area of a skidding tyre. No single capability can be extracted but certain qualities can be deduced from comparative measurements using the same friction measurement device on the same surface;

(7) The measured values are to be compared with measured values from previous tests in order to monitor the trend of the texture, contaminant and drainage characteristics of the runway pavement.

(b) Texture

(1) At low speed, the microtexture of the aggregates in the tyre pavement contact patch area penetrates the residual water film between the pavement and the rubber. These are qualities associated with 65 km/h. Lower comparative values at low speed indicate reduced exposed microtexture and are indicative of microtexture cover-up (rubber) and polishing of aggregates;

(2) At higher speed, the microtexture may not penetrate the residual water film. As speed increases, the residual water film may become thicker and reduce the amount of microtexture that penetrates the water film. If no microtexture penetrates the water film, there is no effect of the microtexture on the performance of the aircraft tyre. The tyre then goes into an aquaplaning mode with no stopping and directional control capability. These are qualities associated with 95 km/h, and lower comparative values are indicative of the combined rubber build-up and reduced drainage capability;

(3) Macrotexture creates escape channels for bulk water and reduces the susceptibility of the pavement surface to build up water films under the aircraft tyre. Lower comparative values at high speed indicate reduced macrotexture.

(c) Contaminant

(1) The most common contaminant to consider is the build-up of rubber. Build up of rubber reduces the amount of exposed microtexture and the fill-up of the macrotexture, and thereby reduces the drainage capability of the pavement in the tyre pavement contact patch area. Affected areas can readily be identified by the eye;

(2) If the aerodrome operator suspects that the runway has a microtexture problem, this can be identified by the touch; pavement surface does feel ‘sandpapery’. This applies to both rubber build-up, where the aggregates get covered, and the polishing of aggregates.

(d) Drainage

(1) The aircraft tires’ contribution to drainage is the drainage through the longitudinal grooves. The pavements’ contribution is the drainage through their macrotexture. This drainage can be in all directions, and in the case of porous friction course drainage downwards, through the porous friction course layer itself. If the pavement is transverse grooved, the drainage in the transverse direction of travel is enhanced. Lower comparative values at high speed indicate reduced drainage capability under the aircraft tyre and reduced macrotexture;

(2) It should be noted that the effects of drainage defects, such as ponding and rutting, will not be detected by comparative measurements by self-wetting continuous friction measuring devices. As the self-wetting continuous friction measurements are performed on a dry runway, there will be no ponding, nor any water stream in any rutting if the runway has such defects.

AMC4 ADR.OPS.C.011(a)(2) Maintenance of pavements – Surface friction assessment and reporting

RECORDS

appropriate records of all runway surface friction assessments are kept for a period as mentioned in ADR.OR.G.035- Record keeping, from the date of assessment.

The following items should be recorded for each assessment, and made available upon request to the GCAA:

(a) Date and time of assessment, including operative's name;

(b) Runway assessed;

(c) Run number and runway direction;

(d) Distance from the centreline and on which side of centreline the run was performed;

(e) Constant run speed (km/h) for each run;

(f) Run length;

(g) Test water depth;

(h) Test tyre type;

(i) Measure of tyre wear;

(j) Surface condition and air temperature;

(k) Average friction level per run; and

(l) Friction levels indicating 100 m rolling average by portion.

Furthermore, should maintenance intervention be indicated, the location, extent, methods employed and results should be recorded.

AMC2 ADR.OPS.C.011(b) Maintenance of pavements – Surface friction assessment and reporting

EVALUATION AND ROLLING AVERAGE

(a) During a standard run friction reading are collected by the CFME along the line of the complete run. An averaged friction value should be collected in 10 m increments along the run so that, over a distance of 100 m, an average can be calculated.

(b) The aerodrome operator should review the results of each runway friction assessment and take the following action:

Friction level indicates	Action to be taken
a falling trend	the aerodrome operator should increase the frequency of runway friction assessments in order to identify any further or rapid deterioration and, if appropriate, any action to be taken.
below the MPL	maintenance should be arranged to restore the friction level, ideally to a value equal to or greater than the MPL. Reference to each 10 m reading on the standard runs should indicate target areas.
below the MFL	maintenance should be arranged urgently in order to restore the friction readings to an acceptable level.

Table OPS 33 : Friction levels and actions to be initiated

(c) if the lowest 100 m rolling average by portion is below MFL, a NOTAM should be issued by the aerodrome operator advising that the runway 'MAY BE SLIPPERY WHEN WET'.

Note (1): The NOTAM should contain information to assist aircraft operators to adjust their performance calculations where possible. This should include the location and extent of where friction values are below MFL.

Note (2): Promulgation of NOTAM is not considered as a corrective action.

GM1 ADR.OPS.C.011(b) Maintenance of pavements – Surface friction assessment and reporting

ROLLING AVERAGE

(a) To assist in understanding the rolling average process, as an example, a 1,000 m run would collect 100 hundred-meter readings in 10 m increments.

The first rolling average is the sum of the first 10 readings divided by 10 (RA1). The second

rolling average is the sum of readings number 2 to 11 divided by 10 (RA2) and so on to the end of the run.

The last rolling average, in this example, is the sum of readings number 90 to 100 divided by ten. A rolling average is best visualised as a 100 m long cursor passing over the surface of the runway. Figure below shows the cursor has reached a position from RA12 to RA22 (e.g. from 210 m to 310 m along the run);

(b) This cursor can be moved to 10 different positions whilst still including the 10 m increment in question (i.e. RA22).

By comparing the values shown against each 10 m increment on the runway against the adjacent line representing the rolling average the difference should be self-evident. After a value has been attributed to every 10 m increment of the run, the CFME's onboard software sifts these average friction values and selects the lowest of them. So, at the start of the run there will be only one to choose from (RA1).

However, at 10 m there will be two values from which to select (RA1 and RA2) etc. This process is repeated throughout the run in order to locate the minimum 100 m rolling average at any 10 m segment on the run.

(c) The procedure for calculating the 100 m rolling average for each run is repeated in a similar fashion for each of the three portions across the runway. In each case, the applicable runs across the width of each Portion are first averaged before undertaking the rolling average calculation as described above.

(d) By reference to the software's display function a representation of the runway spilt into portions can be called up. Only when a minimum 100 m rolling average by portion falls below the MFL, generally shown as a red shaded area, does an Aerodrome Operator have to issue a NOTAM declaring the runway 'MAY BE SLIPPERY WHEN WET'.

(e) Consideration should be given to the installation and use of Global Positioning System (GPS) which will ensure accuracy of the distance from runway centerline and aid the consistency of the runs undertaken.

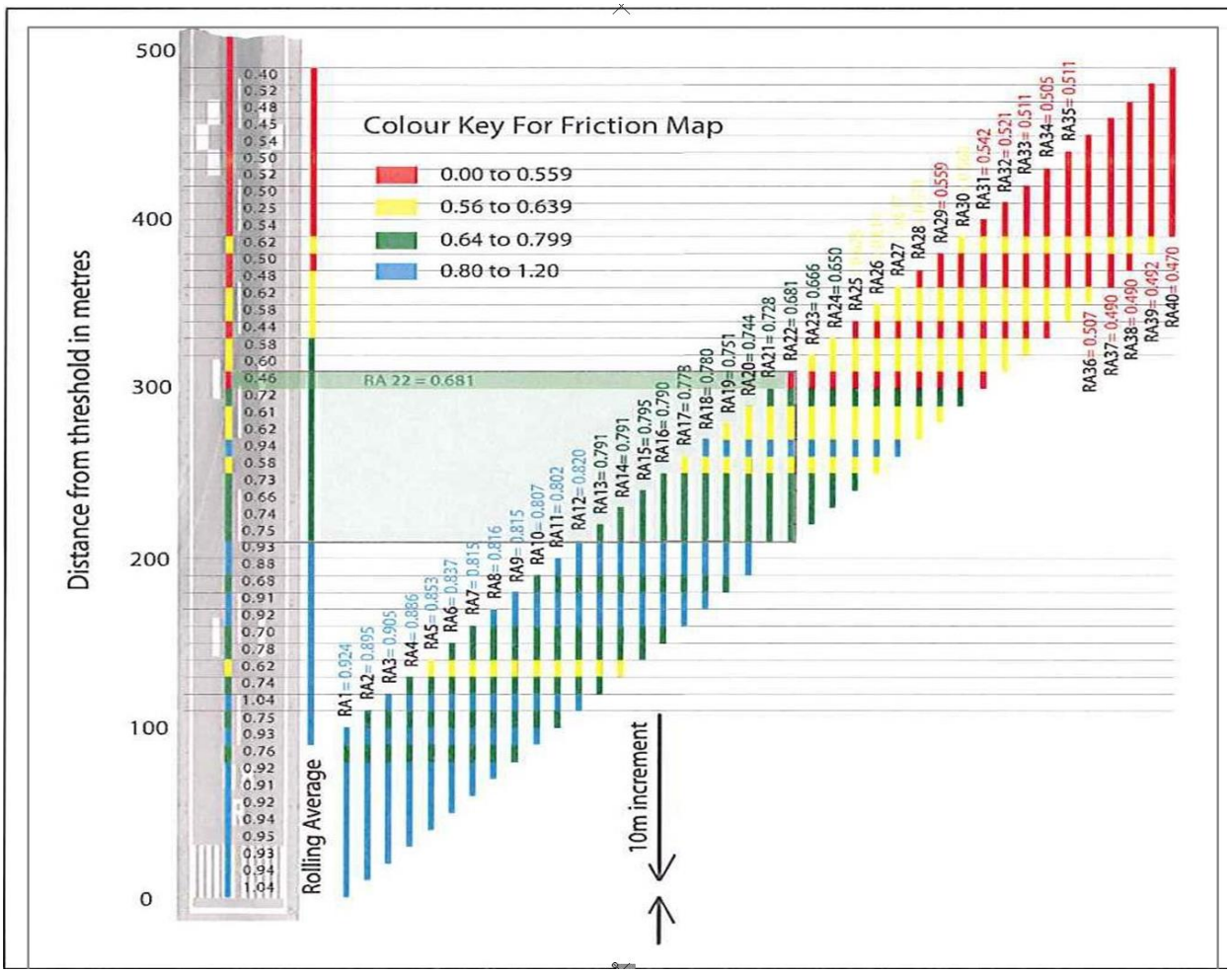


Figure OPS 37: Example of rolling average

ADR.OPS.C.013 Overload operations

(a) Whenever the aerodrome is expected to be used by aircraft that may damage the pavements, the aerodrome operator shall establish criteria for overload operations.

AMC1 ADR.OPS.C13 Overload operations

CRITERIA FOR OVERLOAD OPERATIONS

(a) For those operations in which the magnitude of overload and/or the frequency of use do not justify a detailed analysis, the aerodrome operator should use the following criteria, in order not to adversely affect the pavement:

(1) for flexible and rigid pavements, occasional movements by aircraft with ACR not exceeding 10 % above the reported PCR may be allowed; and

(2) the annual number of overload movements should not exceed approximately 5 % of the total annual movements excluding light aircraft.

(b) The aerodrome operator should not permit overload operations on pavements exhibiting signs of distress or failure.

Furthermore, overload operations should be avoided during any periods of thaw following frost penetration, or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the aerodrome operator should review the relevant pavement condition regularly, and should review the criteria for overload operations periodically, since repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement.

GM1 ADR.OPS.C.013 Overload operations

GENERAL

(a) All pavements forming part of the Movement Area should be of adequate bearing strength for the types of aircraft expected to use the aerodrome. All pavements should be regularly examined by a suitably qualified person. Any pavements which have been subjected to overload conditions should be closely monitored by suitably qualified staff for a period of several weeks or until it is clear that no rapid deterioration of the pavement has been triggered.

(b) Overloading of pavements can result either from loads too large, or from substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behavior are not subject to a particular limiting load above which they suddenly or catastrophically fail.

(c) Behavior is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient with only limited loss of pavement life expectancy and relatively small acceleration of pavement deterioration.

(d) Where operations are outside the criteria defined in AMC1 ADR.OPS.C13 Overload operations , then Aerodrome Operators should arrange a detailed analysis by suitably qualified personnel. The result may be such that operations are limited or restricted. In any event, Aerodrome Operators must be cognizant of the fact that pavement rehabilitation measures may be required earlier than planned due to an acceleration rate of pavement deterioration and shortened service life.

(e) Aerodrome Design Manual (Doc 9157), Part 3, includes the descriptions of more detailed procedures for evaluation of pavements and their suitability for restricted overload operations.

ADR.OPS.C.015 Maintenance of visual aids and electrical systems

(a) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability of the electrical systems and the availability of power supply to all necessary facilities of the aerodrome, in a manner that ensures the safety, regularity and efficiency of air navigation.

(b) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability of the individual lights and the aerodrome's lighting systems reliability, in a manner that ensures continuity of guidance to, and control of aircraft and vehicles, as follows:

(1) For a precision approach runway Category II or III, the system of preventive maintenance shall have as its objective that, during any period of Category II or III operations, all approach and runway lights are serviceable and that, in any event, at least:

(i) 95 % of the lights are serviceable in each of the following elements:

A. precision approach Category II and III lighting system, the inner 450 m;

B. runway centre line lights;

C. runway threshold lights;

D. runway edge lights.

(ii) 90 % of the lights are serviceable in the touchdown zone lights;

(iii) 85 % of the lights are serviceable in the approach lighting system beyond 450 m;

(iv) 75 % of the lights are serviceable in the runway-end lights.

(2) The lights that may be unserviceable in accordance with point (1) shall not alter the basic pattern of the lighting system.

(3) An unserviceable light shall not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

(4) For a stop bar that is provided at a runway-holding position and is used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have the following objectives:

(i) no more than two lights shall remain unserviceable;

(ii) two adjacent lights shall not remain unserviceable unless the light spacing is significantly less than that required.

(5) For a taxiway intended for use in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have as its objective that no two adjacent taxiway centre line lights be unserviceable.

(6) For a precision approach runway Category I, the system of preventive maintenance employed shall have as its objective that, during any period of Category I operations, all approach and runway lights are serviceable and that, in any event:

(i) at least 85 % of the lights are serviceable in each of the following:

A. precision approach Category I lighting system;

B. runway threshold lights;

C. runway edge lights;

D. runway-end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that required.

(7) For a runway meant for take-off in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have as its objective that, during any period of operations, all runway lights are serviceable, and that, in any event:

(i) at least:

A. 95 % of the lights are serviceable in the runway centre line lights (where provided) and in the runway edge lights;

B. 75 % of the lights are serviceable in the runway-end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light.

(8) For a runway meant for take-off in runway visual range conditions of a value of 550 m or greater, the system of preventive maintenance shall have as its objective that, during any period of operations, all runway lights are serviceable, and that, in any event:

(i) at least 85 % of the lights are serviceable in the runway edge lights and runway- end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light.

(9) For a runway equipped with visual approach slope indicator systems, the system of preventive maintenance shall have as its objective that, during any period of operations, all units are serviceable. A unit shall be considered unserviceable if the number of unserviceable lights is such that the unit does not provide the intended guidance to the aircraft.

(c) For the purposes of point (b), a light shall be deemed to be unserviceable if:

(1) the main beam average intensity is less than 50 % of the value specified in the certification specifications issued by the GCAA. For light units where the designed main beam average intensity is above the value specified in the certification specifications issued by the GCAA, the 50 % value shall be related to that design value;

(2) the filter associated with the light is missing, damaged, or the light does not produce the correct colour light beam.

(d) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability and reliability of the system of markings and signs of the aerodrome, in a manner that ensures continuity of guidance to, and control of aircraft and vehicles.

(e) Construction or maintenance activities shall not take place in the proximity of aerodrome electrical systems when low-visibility procedures are in effect at the aerodrome.

(f) The aerodrome operator shall ensure that:

(1) the preventive maintenance programmes referred to in points (a), (b) and (d) include appropriate inspections and checks of the individual elements of each system, and of the system itself, which are conducted in accordance with established procedures, and at defined intervals, appropriate to the intended operation and system;

(2) A system of preventive maintenance of visual aids shall be employed to ensure lighting and marking system reliability.

(3) appropriate corrective actions are taken to rectify any identified defects.

(g) The aerodrome operator shall maintain records of the relevant maintenance activities.

GM1 ADR.OPS.C.015(a)(f) maintenance of visual aids and electrical systems

ELECTRICAL SYSTEMS

(a) Schedules of routine maintenance of the individual elements of the aerodrome's electrical systems should be based on manufacturers' instructions, adjusted to the aerodrome operator's experience regarding the frequency of malfunctions.

(b) The maintenance programme should, as a minimum, include the following:

(1) power cables and distributors in field;

(2) transformers and regulators;

(3) transformer stations for electric power supply;

(4) relay and switch cabinets;

(5) control cables, monitoring units and control desk;

(6) secondary power supply; and

(7) fixed ground power supply for aircraft,

and should contain the frequency of the scheduled maintenance activities and the elements that should be checked during each inspection.

(c) Checklists to be used during the scheduled maintenance activities should be developed by the aerodrome operator.

(d) The relevant procedures should cover the maintenance activities for each area, including the way such activities should be implemented.

GM2 ADR.OPS.C.015(a)(f) Maintenance of visual aids and electrical systems

ELECTRICAL SYSTEMS

(a) The specifications mentioned in this chapter are intended to define the maintenance performance level objectives. They are not intended to define whether the lighting system is operationally out of service.

(b) The serviceability and reliability of air navigation equipment and installations are prerequisites for the safe operation of aircraft in the aerodrome area, but also for the regularity and efficiency of the air transportation system.

(c) The required serviceability of installations and equipment can only be achieved if constant power supply is ensured.

(d) To this end, regular maintenance work is required for aerodrome equipment and installations distributing primary power and equipment supplying the secondary power when there is such a need.

(e) Special attention needs to be given to cases where there is interconnection between the electrical systems of the various components of the aerodrome (e.g. terminal building with lighting systems etc.).

(f) Further guidance on the issue may be found in Chapter 3 of Part 9 ‘Airport Maintenance Practices’ of ICAO Doc 9137 ‘Airport Services Manual’.

GM3 ADR.OPS.C.015(a)(f) Maintenance of visual aids and electrical systems

ELECTRICAL SYSTEMS

Electrical systems, and parts thereof, may also be subject to certain requirements (e.g. national) which address elements or aspects that do not fall within the scope of this CAR. Such requirements should not be neglected when determining the maintenance programme.

GM3 ADR.OPS.C.015(b) Maintenance of visual aids and electrical systems

LIGHTING SYSTEMS — SERVICEABILITY LEVELS

Serviceability levels are intended to define the maintenance performance level objectives.

With respect to barrettes, crossbars and runway edge lights, lights are considered adjacent if located consecutively and:

(a) laterally: in the same barrette or crossbar; or

(b) longitudinally: in the same row of edge lights or barrettes.

In barrettes and crossbars, guidance is not lost by having two adjacent unserviceable lights.

Further guidance on the development of preventive maintenance programme of lights is given in Chapter 2 of Part 9 'Airport Maintenance Practices' of ICAO Doc 9137 'Airport Services Manual'.

GM1 ADR.OPS.C.015(b);(c) Maintenance of visual aids and electrical systems

UNSERVICEABLE LIGHTS

(a) CS ADR-DSN.U.940 'Aeronautical ground light characteristics' contains the figures for determining the unserviceability of individual lights;

(b) The aerodrome operator needs, however, to consider defining, as part of its maintenance programme, two levels of intensity for individual lights, i.e. a maintenance level and the unserviceability level;

(c) The higher level gives aerodrome maintenance personnel advance warning that a light unit is beginning to produce an output significantly below the required value. This level is always above 50 per cent of the specified intensity, which is the level at which the light is classified as being outside specification tolerance and therefore to have failed from an operational perspective. Once the light output reaches the maintenance level, corrective action can be scheduled. This prevents lights from losing performance to the level where immediate maintenance action must be taken.

AMC1 ADR.OPS.C.015(b)(f) Maintenance of visual aids and electrical systems

LIGHTING SYSTEMS

GROUND CHECKS

(a) As part of the maintenance programme, the lighting system maintenance activities should include ground checks. During the daily checks, the lighting systems should be checked at least for light failures, breakage or gross misalignment and correct operation of the intensity control system;

The maintenance programme should identify the frequency of other checks that need to be performed throughout the year, as well as their content. Moreover, irrespective of the runway type, the aerodrome operator should ensure the serviceability of the lights by conducting photometric measurements, at appropriate intervals, as part of the maintenance programme;

(b) Ground checks of visual approach slope indicator systems (VASIS) should determine their alignment and serviceability. The alignment of VASIS should be checked at defined intervals, taking into

account environmental conditions (e.g. rain, drought, etc.) that may affect the stability of the system, using an appropriate intensity setting. Additional checks should be conducted following an aircraft occurrence. Errors in excess of one minute of arc should be corrected. The maintenance programme should also cover the obstacle protection surface of the VASIS to ensure that it is clear of all obstacles;

The serviceability of VASIS should be checked on each runway inspection. With regard to serviceability of the precision approach path indicator (PAPI) and abbreviated precision approach path indicator (APAPI), a unit should be considered to be unserviceable if more than one light is unserviceable and the unit consists of three or more lights; or at least one light is unserviceable and the unit consists of less than three lights. In addition, whenever a red filter does not produce the correct colour light beam, is missing, or is damaged, all the lights associated with that filter should be extinguished until the red filter is rectified.

(c) For a precision approach runway:

(1) The system of preventive maintenance employed should include at least the following checks:

(i) visual inspection;

(ii) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting systems; and

(iii) control of the correct functioning of light intensity settings used by air traffic control.

(iv) For CAT II and CAT III, in addition to (i),(ii) and (iii) in-field measurement of the intensity, beam spread and orientation of lights included in the approach and runway lighting systems

(2) In-field measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems should be undertaken by measuring all lights, as far as practicable, to ensure conformance with the appropriate figure in CS ADR-DSN.U.940.

(3) Measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems should be undertaken using an appropriate measuring unit of sufficient accuracy to analyse the characteristics of the individual lights.

(4) The frequency of measurement should be based on traffic density, the local pollution level, the reliability of the installed lighting equipment and the continuous assessment of the results of the in-field measurements but, in any event, should not be less than twice a year for in-pavement lights and not less than once a year for other lights.

FLIGHT CHECKS

(d) As part of the maintenance programme of the lighting systems, flight check of the approach, runway and taxiway lighting systems, VASIS, aerodrome beacon, and the light intensity control system should be carried out at regular intervals, at least on a yearly basis, to ensure that the pattern is correct and that lights are operating properly. Special flight checks should be arranged in case of major maintenance of, or changes to, such systems, as well as before the commissioning of new systems, both at day and night.

ROUTINE MAINTENANCE

(e) PAPI maintenance should include checking and, if necessary, taking the indicated corrective action, as follows:

(1) Twice monthly:

(i) Elevation setting of the vertical angle of the light units; adjusting;

(ii) Spreader glasses, filters and lamps for cleanness; cleaning.

(2) Annually (within 360 calendar days +/- 20 days):

(i) System from the air, and recording results; adjusting and replacing lamps;

(ii) Supporting structure and the foundation of each unit; carry out repairs when needed .

(3) A daily check should be made of each unit to ensure that:

(i) All lamps are lighted and illuminated evenly;

(ii) No evidence of damage is apparent;

(iii) The change from red to white is coincident for all elements in a unit; and

(iv) The lenses are not contaminated.

GM1 ADR.OPS.C.015(b)(f) Maintenance of visual aids and electrical systems

LIGHTING SYSTEMS

GROUND CHECKS — GENERAL

(a) The ground checks of the lighting system includes a set of different actions that would need to be undertaken at different intervals. These checks include but are not limited to the following:

(1) broken lights or parts of the unit;

(2) condition of filters;

(3) corrosion;

(4) cleanness;

(5) tightening of fasteners of units;

(6) alignment of lights;

(7) presence of moisture/water;

(8) electrical connections of lights; and

(9) condition of structure and the foundation of each unit.

GROUND CHECKS —VASIS

(a) VASIS are used in order to provide correct visual glide slope indication to the flight crews in all variable weather conditions, by day and by night. It is therefore imperative that the maintenance programme ensures the correct alignment of the system, as well as its serviceability at all times. In order to achieve this, a suitable maintenance programme, including the correct frequency of ground checks, needs to be developed and implemented.

(b) During daily checks, the general condition of each unit is checked to determine the following:

(1) all lights are lighted and illuminated evenly;

(2) there is no evidence of apparent damages;

(3) the change from red to white is coincident for all elements in a unit; and

(4) the lenses are not contaminated.

(c) Regarding the alignment of VASIS, the individual unit setting angles are checked by means of angular measurement, in accordance with the manufacturer's instructions. A visual comparison between all the units in the system set at the same angle may be used to identify a unit in which there is a misalignment between the optical system and the datum plate. The cause of any misalignment of this nature needs to be ascertained and corrected before any adjustment is made to the setting angles.

(d) Where the ground where the VASIS are installed is less stable, or intense weather phenomena such as heavy rain or drought take place, or variations in weather occur, the aerodrome operator needs to adjust the ground checks of the VASIS, as such phenomena may lead to misalignment of the VASIS. In this way, gross alignment errors may be prevented.

FLIGHT CHECKS

(a) Flight checks for precision approach runways are more frequent and detailed than other runway types.

(b) Lights are checked for failures and alignment, while the VASIS are also be checked for correct approach slope, and compatibility with the non-visual aids, if available. Moreover, the balance of light intensity, at all intensity settings, needs to be checked.

(c) During daylight flight checks, an assessment of the markings needs also to take place.

(d) Flight checks may be arranged to be conducted with the planned calibration flights of the non-visual aids. The opportunity is also be taken to identify any confusing or misleading lights in the aerodrome surroundings.

(e) Further guidance on how to conduct a flight check and the items that need to be checked during the flight check may be found in Chapter 5 of Part 8 'Airport Operational Services' of ICAO Doc 9137 'Airport Services Manual', and in Chapter 8 of Part 4 'Visual Aids' of ICAO Doc 9157 'Aerodrome Design Manual'.

GM1 ADR.OPS.C.015(d) Maintenance of visual aids and electrical **systems**

REMOVAL OF MARKINGS

(a) Whenever, for maintenance or other purposes (e.g. relocation of markings, redesign of pavements), a marking on the movement area is not needed any longer, the marking should be physically removed..

(b) The removal of the marking may be accomplished by using various techniques, but irrespectively of the technique used, it should not cause damage to the pavement or parts of the lighting systems.

(c) In order to eliminate the visual appearance of the removed marking(s) on the pavement, the physical removal of any old marking(s) should include a predetermined larger size and shape of the area occupied by the marking(s), that encompasses the old marking(s), and by grouping adjacent markings together into a larger rectangular removal area.

GM1 ADR.OPS.C.015(d) Maintenance of visual aids and electrical systems

REMOVAL OF MARKINGS

(a) A marking may need to be removed for various reasons (marking patterns are changed, physical areas or operating procedures are modified, or the thickness of the layers of paint becomes excessive, etc.)

(b) It has been found that covering markings that need to be removed, with a darker colour (e.g. black or dark grey) in order to make them resemble the colour of the adjacent pavement (e.g. runway, apron, taxiway) is likely to mislead the flight crews, as well as drivers operating in this area because of the reflection of the sun or other sources of light upon the new surface. Moreover, the surface layer of paint will wear away or erode and the lower layers will become visible and this may cause confusion.

(c) Methods used for removing unnecessary markings include but are not limited to water blasting, sand blasting, chemical removal, burning, etc.

(d) If the sand blasting method is used, arrangements are necessary to remove the sand deposited on the pavement as the work progresses, in order to prevent accumulation.

(e) Grinding is not recommended because of the damage to the pavement surface and probable reduction of the friction characteristics.

(f) When chemicals are used for marking removal, a large and continuous source of water is usually needed to reduce potential damage to pavement surfaces and to dilute the chemicals washed into drains or channels. Prior to the use of chemicals, consideration is necessary to the applicable environmental protection requirements.

(g) If burning is used to remove a marking, care is necessary not to damage the pavement surface, as a result of the extended periods of exposure to the heat source.

GM1 ADR.OPS.C.015(d)(f) Maintenance of visual aids and electrical systems

MARKINGS AND SIGNS

(a) Markings

A system of preventive maintenance of visual aids should be employed to ensure marking system reliability, both day and night. All markings should be inspected thoroughly at least semiannually, depending on local weather conditions, and corrective action should be taken in case of need, such as peeling, discolourment, fading, or accumulation of deposits;

(b) Signs

Maintenance should ensure integrity and perfect legibility of the information provided by the signs. Checks for each sign should be both scheduled (daily, annual) and unscheduled, and should take into account the instructions of the manufacturer.

GM1 ADR.OPS.C.015(d)(f) Maintenance of visual aids and electrical systems

MARKINGS AND SIGNS

(a) An assessment of the condition of the signs and markings performed during the night when compared with an assessment performed during the daylight, allows determining the reflectivity of the marking. Therefore, the maintenance programme takes due account of this;

(b) Daily checks of signs need to focus on the functioning of the lamps, the legibility of inscriptions, damage to the sign panels, fading of the colours, and the removal of possible obstructions. During night inspections, the proper illumination of the signs is also checked;

(c) Annual checks of signs include:

(1) the mounting of both the sign and its lighting; and

(2) the sign’s structure.

Unscheduled checks are necessary after weather phenomena that may affect the functioning of a sign.

SECTION D — APRON MANAGEMENT OPERATIONS (ADR.OPS.D)

ADR.OPS.D.001 Apron management safety related activities

(a) The aerodrome operator shall ensure that means and procedures are established and implemented on the apron in order to:

(1) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

(2) regulate entry of aircraft into, and coordinate exit of aircraft from the apron with the aerodrome control tower;

(3) ensure safe and expeditious movement of vehicles;

(4) ensure safe and efficient conduct of the following activities:

(i) aircraft stand allocation;

(ii) provision of marshalling services;

(iii) aircraft parking procedure and departure from the stand;

(iv) aircraft refuelling;

(v) jet blast precautions and engine tests;

(b) The aerodrome operator, in order to implement point (a) may allocate responsibilities to other organisations. If the aerodrome operator allocates such responsibilities, it shall include the allocation in the aerodrome manual.

(c) Aircraft shall be guided while arriving or departing from the aircraft stand.

(d) Emergency stop procedures shall be in place to stop aircraft when the safety of operations on the aircraft stand is compromised.

(e) Personnel, other than those required to assist the initial arrival and departure of the aircraft, shall not be allowed to approach the aircraft when anti-collision lights are turned on and engines are running.

(f) Parked aircraft shall be appropriately secured to prevent any unintended movement.

(g) Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum.

(h) An apron management service shall be provided with radiotelephony communications facilities. All vehicles/personnel involved with the facilitating the movement of aircraft shall be equipped with a serviceable receive/transmit airband radio.

AMC1 ADR.OPS.D.001 Apron management safety related activities

When the Aerodrome Control Tower does not participate in the Apron Management Service, procedures shall be established to facilitate the orderly transition of aircraft between the apron management unit and the Aerodrome Control Tower.

GM1 ADR.OPS.D.001 Apron management safety related activities

Procedures on apron safety are specified in the PANS-Aerodrome (DOC 9981) Guidance on an apron management service is given in the ICAO Airport Services Manual (Doc 9137), Part 8, and in the ICAO Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

ADR.OPS.D.010 Coordination of aircraft entry to/exit from the apron

(a) The aerodrome operator shall ensure that the aircraft entry to and exit from the apron is coordinated with the air traffic services provider.

where aircraft movement on the apron is not managed by the air traffic service provider. The coordination shall include:

(1) designated handover points between apron management service and air traffic service for arriving and departing aircraft;

(2) designated air-ground communication facilities to be used at the apron;

(3) holding areas for arriving aircraft when aircraft stands are not available.

(b) The aerodrome operator shall provide to the aeronautical information service providers for publication in the Aeronautical Information Publication (AIP):

(1) the designated handover points referred to in point (a)(1);

(2) the designated air-ground communication facilities referred to in point (a)(2).

AMC1 ADR.OPS.D.010(a)(2)(b) (2) Coordination of aircraft entry to / exit from the apron

DESIGNATED AIR–GROUND COMMUNICATION FACILITIES

(a) Depending on the aerodrome layout, traffic density and availability of radio frequencies, air–ground communication facilities allocated to air traffic services (ATS) may also be used at the apron.

(b) The following information should be provided for publication in the aeronautical information publication (AIP) in regard to air–ground communication facilities used at the apron:

(1) service designation;

(2) call sign;

(3) channel(s)/frequency(ies);

(4) hours of operation; and

(5) remarks.

ADR.OPS.D.015 Management of aircraft movements on the apron

The aerodrome operator shall ensure that:

(a) aircraft are provided with instructions on the route to be followed on the apron;

(b) adequate visual aids are provided in order to ensure that flight crews are able to identify the assigned route;

(c) the intended route is free of any obstacle that may risk collision with the moving aircraft.

AMC1 ADR.OPS.D.015(a) Management of aircraft movements on the apron

AIRCRAFT GUIDANCE

Instructions to aircraft should be given either by:

(a) issuing verbal instructions on a predetermined air–ground communication facility; or

(b) using a ‘FOLLOW ME’ vehicle; or

(c) appropriate marshalling hand signals; or

(d) any combination of the above.

GM1 ADR.OPS.D.015(b) Management of aircraft movements on the apron

VISUAL AIDS

Visual aids are considered as the appropriate markings, lights, signs and markers. The technical specifications are included in the Certification Specifications and Guidance Material for Aerodromes Design (CS-ADR-DSN).

AMC1 ADR.OPS.D.015(c) Management of aircraft movement on the apron

PROTECTION OF ROUTES TO BE FOLLOWED BY A MOVING AIRCRAFT (TAXI ROUTES)

The protection of the taxi route of a moving aircraft should be provided by:

(a) segregating taxi routes from vehicular traffic and pedestrian movement;

(b) designating dedicated areas for the parking of vehicles and equipment; and

(c) minimising the crossing of apron taxiways, and when this is not possible because of the apron layout, by allowing crossing only at designated and clearly marked locations.

ADR.OPS.D.025 Aircraft stand allocation

(a) The aerodrome operator shall establish and ensure the implementation of procedures to ensure that the allocated aircraft stand is:

(1) appropriate for the aircraft type intended to use it;

(2) communicated to the organisation responsible for the provision of AMS, when established, or to the appropriate air traffic service provider;

(3) communicated to the persons responsible for the manoeuvring of the aircraft.

(b) The aerodrome operator shall ensure that, at least the following parameters are taken into consideration when allocating aircraft to aircraft stands:

(1) aircraft characteristics;

(2) parking aids;

(3) facilities serving the aircraft stand;

(4) vicinity of infrastructure;

(5) suitable clearances;

(6) aircraft stand dependencies.

(c) A risk assessment shall be carried out if there is a need to allocate aircraft parking to areas other than aircraft stands or apron areas.

GM1 ADR.OPS.D.025 Aircraft stand allocation

RESPONSIBILITY FOR AIRCRAFT STAND ALLOCATION

The overall responsibility for aircraft stands allocation normally lies with the aerodrome operator. The aerodrome operator may also decide to delegate the aircraft stand allocation to an air operator or to an organisation responsible for the provision of ground handling services if they have a dedicated terminal or an apron area. However, the aerodrome operator remains ultimately responsible for ensuring that safety is maintained.

AMC1 ADR.OPS.D.025(a)(3) Aircraft stand allocation

Communication of the assigned aircraft stand to the personnel directly responsible for the manoeuvring of the aircraft.

The information on the stand assigned to arriving aircraft should be communicated to the personnel responsible for the manoeuvring of arriving aircraft:

(a) through a radio frequency; or

(b) through data link communication; or

(c) with a 'FOLLOW ME' vehicle; or

(d) with marshalling hand signals; or

(e) with a visual docking guidance system; or

(f) any combination of the above.

GM1 ADR.OPS.D.025(b)(2) Aircraft stand allocation

PARKING AIDS

The following are considered parking aids:

(a) a visual or an advanced visual docking guidance system;

(b) a marshaller.

GM1 ADR.OPS.D.025(b)(3) Aircraft stand allocation

FACILITIES SERVING THE AIRCRAFT STAND

The following facilities may have an impact on the allocation of aircraft stand:

(a) passenger boarding bridges;

(b) fixed ground power supply units;

(c) air-conditioning units;

(d) location of fuel pits;

(e) equipment parking areas.

ADR.OPS.D.030 Marshalling of aircraft

(a) The aerodrome operator shall ensure that marshalling of aircraft is provided using the marshalling signals in accordance with CAR ROA.

(b) The personnel providing marshalling are initially and continuously trained (including theoretical and practical training) as required in ADR.OR.G.017 -Training and proficiency check programmes and ADR.OPS.D.080 - Training and proficiency check programmes of marshallers and “FOLLOW-ME” drivers.

ADR.OPS.D.035 Aircraft parking

The aerodrome operator shall establish and ensure the implementation of procedures to ensure that:

(a) an area designated for aircraft parking on an apron is monitored to ensure that the clearance distances are maintained during the parking manoeuvre;

(b) guidance is provided to enable the aircraft to park safely;

(c) automated parking guidance systems, if installed, are functioning properly;

(d) persons responsible for aircraft taxiing are alerted to stop the aircraft when the clearance distances are not maintained;

(e) persons, other than those required to assist the aircraft parking procedure, are prohibited to approach the aircraft when anti-collision lights are turned on and engines are running;

(f) the aircraft stand is clear of any Foreign Object Debris (FOD).

AMC1 ADR.OPS.D.035(a) Aircraft parking

MONITORING OF AIRCRAFT STAND

An aircraft stand should be visually monitored in-person or remotely to ensure that the recommended clearance distances are provided to an aircraft using the stand and to ensure the stand is clear of FOD.

AMC1 ADR.OPS.D.035(b) Aircraft parking

OPERATION OF VISUAL AND ADVANCED VISUAL DOCKING GUIDANCE SYSTEMS

The procedure for the operation of visual and advanced visual docking guidance systems should:

(a) require the activation of the docking guidance system only when the stand is considered safe for use by the arriving aircraft and the involved personnel in charge of parking operations are present;

(b) require the activation of the docking guidance system before the aircraft arrives at the stand;

(c) require to check the suitability of the docking guidance system for the type of aircraft the use of the stand is intended for; and

(d) include emergency procedures to inform the flight crew when the parking operation has to be discontinued.

AMC1 ADR.OPS.D.035(c) Aircraft parking

INSPECTION OF VISUAL/ADVANCED VISUAL DOCKING GUIDANCE SYSTEMS

Where a visual/advanced visual docking guidance system is provided, the aerodrome operator should ensure that the stopping guidance element is calibrated and is clearly and unambiguously indicated to all selected aircraft. The visual/advanced visual docking guidance system should be regularly checked for accuracy. Such systems should be subjected to daily serviceability checks whose results should be recorded.

GM1 ADR.OPS.D.035(c) Aircraft parking

CONTINGENCY

Aerodrome Operators should:

(a) Develop and implement contingency arrangements to deal with the possibility of apron congestion due to a large influx of diverted aircraft.

These arrangements should include:

(1) the setting up of a liaison committee of all parties concerned to enable quick decisions to be made;

(2) warning arrangements to alert operators and arriving traffic to any approaching saturation of apron or terminal facilities;

(3) contingencies for parking additional aircraft on a taxiway if a state of emergency is declared by an arriving aircraft and all aprons are occupied; and

(4) contingencies for upgrading effectively the RFFS category to accommodate a diverting aircraft.

(b) Aerodrome Operators should ensure that their operational staff:

(1) answer query (from ATS Units) about any relevant information about the diverted aircraft;

ADR.OPS.D.040 Aircraft departure from the stand

The aerodrome operator shall establish and ensure the implementation of procedures to ensure that during the departure of an aircraft from the aircraft stand:

(a) ground servicing equipment, excluding push-back trucks if required for the movement of aircraft, and vehicles have been removed from the aircraft stand or parked in designated areas;

(b) if the aircraft stand is served by passenger boarding bridges, they have been retracted;

(c) the designated exit route from the aircraft stand is free of foreign object debris (FOD);

(d) vehicle movements on the stand and traffic on the adjacent road(s) have ceased, except for push-back trucks if required for the movement of aircraft;

(e) persons, other than those required to assist the aircraft departure from the aircraft stand, are prohibited to approach the aircraft when anti-collision lights are turned on and engines are running.

GM1 ADR.OPS.D.040(c) Aircraft departure from the stand

DESIGNATED EXIT ROUTE

Designated exit route is the path intended to be followed by the aircraft to leave the stand.

GM1 ADR.OPS.D.040(e) Aircraft departure from the stand

PERSONNEL THAT ASSIST AIRCRAFT TO DEPART FROM THE STAND

Personnel that assist aircraft to depart from the stand are, for example: tow-truck operators and push-back coordinators; wing walkers; personnel that remove wheel chocks, fixed and mobile ground power units and air-conditioning units.

ADR.OPS.D.045 Dissemination of information to organisations operating at the apron

(a) The aerodrome operator shall disseminate information regarding limitations to operations on the apron in a timely manner to relevant organisations operating on the apron.

(b) The information to be provided shall include but not limiting to the following, as applicable:

(1) the type of the limitation;

(2) the duration of the limitation, if known;

(3) mitigation measures to be applied;

(4) the operational impact of the limitation;

(5) availability of aircraft stands;

(6) restrictions on aircraft stands;

(7) availability of fixed installations at aircraft stands;

(8) special parking procedures;

(9) temporary changes of driving routes;

(10) work in progress;

(11) any other information including low visibility procedures that has operational significance to the apron users.

GM1 ADR.OPS.D.045 Dissemination of information to organisations operating at the apron

INFORMATION SHARING

Foreknowledge of the limitations to the operations at the apron will help maintain safety. The requirement to establish a process for disseminating operational information does not necessarily mean that the aerodrome operator has to develop a technical system specific to a particular aerodrome. The methods and the means selected depend on the complexity of the aerodrome, the number of organisations or apron users that have to be informed, existing systems, etc

ADR.OPS.D.050 Alerting of emergency services

(a) The aerodrome operator shall:

(1) establish and implement in the aerodrome emergency plan a procedure for alerting emergency services for accidents and incidents at the apron;

(2) provide the appropriate means and facilities for alerting the relevant emergency services.

(b) The procedure established by the aerodrome operator shall include at least the following:

(1) the contact details and the means that shall be used for alerting the emergency services;

(2) the information that has to be given to emergency services in order to handle the incident efficiently, such as:

(i) location of the accident or incident;

(ii) nature of the accident or incident;

(iii) damages;

(iv) injuries to persons;

(v) dangerous goods.

AMC1 ADR.OPS.D.050(a)(2) Alerting of emergency services

MEANS TO ALERT THE EMERGENCY SERVICES

The following means should be available to alert the emergency services:

(a) radios; or

(b) telephones; or

(c) emergency buttons; or

(d) any combination of the above.

GM1 ADR.OPS.D.050(a)(2) Alerting of emergency services

SELECTION OF MEANS TO ALERT THE EMERGENCY SERVICES

The means that could be used to alert the emergency services depend on the size and complexity of the aerodrome. The requirements that apply locally would be assessed and the most appropriate means would be selected.

ADR.OPS.D.055 Jet blast precautions

(a) The aerodrome operator shall make apron users aware of the hazards arising from jet blast and propeller slipstream.

(b) The aerodrome operator shall require the apron users to secure vehicles and equipment properly and designate parking areas where the effect of jet blast or propeller slipstream is minimised.

(c) When designing or making changes to apron layouts, the aerodrome operator shall take into consideration the effect of jet blast or propeller slipstream.

(d) The aerodrome operator shall identify jet blast-sensitive places and shall either publish a request for minimum thrust to pilots, or take appropriate mitigating measures to minimize the jet blast effect.

GM1 ADR.OPS.D.055(a) Jet blast precautions

INFORMATION ON HAZARDS

Information on the hazards caused by jet blast and propeller slipstream should be provided to the apron users through:

(a) safety training; or

(b) safety promotion; or

(c) a combination of the above.

GM2 ADR.OPS.D.055(d) Jet blast precautions

PUBLICATION OF REQUEST FOR MINIMUM THRUST

The request to pilots for minimum thrusts at specific locations at the apron should be published in the aeronautical information publication (AIP). If necessary, information signs may be installed at these locations.

ADR.OPS.D.060 Aircraft refuelling

(a) The aerodrome operator shall establish a procedure for aircraft refuelling.

(b) The procedure shall require the following:

(1) the prohibition of open flames and the use of electrical or similar tools likely to produce sparks or arcs within the refuelling zone;

(2) the prohibition to start ground power units during refuelling;

(3) the existence of an unobstructed path from the aircraft to allow the quick removal of fuel bowsers and persons in case of emergency;

(4) the correct bonding of aircraft and fuel supply sources and the correct application of earthing procedures;

(5) the immediate notification of the fuelling supervisor in case of fuel spillage and detailed instructions on how to handle fuel spillages;

(6) the positioning of ground support equipment in such a way that emergency exits are free of any obstruction to allow the expeditious evacuation of the passengers, if passengers are embarking or disembarking or remain in the aircraft during refuelling;

(7) the ready availability of fire extinguishers of a suitable type for at least initial intervention in the event of a fuel fire;

(8) the discontinuation of refuelling operations if electrical thunderstorms are at or in the vicinity of the aerodrome.

ADR.OPS.D.065 Engine test

(a) The aerodrome operator shall establish and implement an engine test procedure.

(b) The procedure shall include the following:

(1) the person that has the authority to approve engine tests;

(2) the areas where engine tests are conducted;

(3) the safety measures that need to be taken.

GM1 ADR.OPS.D.065 Engine test

GENERAL

(a) Where possible, engine tests are performed at designated remote areas.

(b) Engine run-ups at or above idle power are not permitted in cul-de-sacs, or in areas where the jet efflux would affect stands, equipment areas or work areas.

(c) Engine tests approved at stands in regular use at the apron should be limited to check starts and idle power only.

(d) Where engine tests are permitted to be performed at the apron, a remote area should be selected where the jet blast will not affect other apron areas and busy taxiways.

(e) Where necessary, engine tests are safeguarded by ground personnel that arrange for any rear of stand roads and, if needed, sections of the taxiway to be closed.

(f) The area behind and adjacent to the cone(s) of the blast will be clear of equipment and the ground must be firm and without loose tarmac, stones or other material.

ADR.OPS.D.070 High-visibility clothing

The aerodrome operator shall require that all personnel working airside, on the movement area shall wear high-visibility clothing.

ADR.OPS.D.071 Ground servicing of aircraft

(a) Fire extinguishing equipment suitable for at least initial intervention in the event of fuel fire and personnel trained in its use shall be readily available during the fuelling operations of an aircraft, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

(b) While passengers are embarking or disembarking an aircraft, ground equipment shall be positioned so as to allow:

(1) unrestricted access/egress of exit routes for the expeditious evacuation of passengers and fuelling vehicles; and

(2) a ready escape route from each of the exits to be used in an emergency.

(c) When aircraft refuelling operations take place while passengers are embarking on board or disembarking , ground equipment shall be positioned to allow:

(1) The use of sufficient number of exits for expeditious evacuation and

(2) A ready escape route from each exits to be used in an emergency

ADR.OPS.D.080 Training and proficiency check programmes of marshallers and “FOLLOW-ME” drivers

(a) The aerodrome operator shall ensure that the below mentioned functions are carried out only by trained and competent persons.

(1) marshalling service;

(2) “FOLLOW-ME” guidance.

(b) The training programme shall be implemented in accordance with ADR.OR.G.017- Training and proficiency check programmes.

(c) The training shall be designed to impart fundamental knowledge and practical skills related to the execution of their duties.

(d) The aerodrome operator shall ensure the implementation of a proficiency check programme for personnel referred to in point (a) in order to ensure:

(1) their continued competence;

(2) that they are aware of the rules and procedures relevant to their functions and tasks.

AMC1 ADR.OPS.D.080(a)(2) Training and proficiency check programme of marshallers and ‘FOLLOW-ME’ drivers

TRAINING FOR ‘FOLLOW-ME’ VEHICLE DRIVERS

(a) As part of the training programme, the initial training for ‘FOLLOW ME’ drivers should cover, at least, the following aspects:

(1) the role and responsibilities of the ‘FOLLOW-ME’ driver;

(2) the content of AMC2 ADR.OPS. B.025 **‘**Operation of vehicles’;

(3) ‘FOLLOW-ME’ specific communication procedures, including radiotelephony procedures;

(4) the visual signals;

(5) aircraft taxiing speed and appropriate aircraft–vehicle spacing;

(6) specific procedures for guiding aircraft and/or vehicles;

(7) aircraft characteristics, both physical and operational;

(8) ‘FOLLOW-ME’ specific procedures for low-visibility operations;

(9) emergency procedures in the event of an accident or an incident; and

(10) the operation of ‘FOLLOW-ME’ vehicles and their equipment.

(b) 'FOLLOW-ME' vehicle drivers should be briefed or, if required, trained in new procedures or in changes to existing procedures.

SUBPART - CERTIFICATION SPECIFICATIONS AND GUIDANCE MATERIAL FOR AERODROME DESIGN (CS-ADR- DSN)

CHAPTER A — GENERAL

CS ADR-DSN.A.001 Applicability

The certification Specifications (CS) and the related guidance material (GM) are applicable to aerodromes (aerodrome certificate , landing area acceptance) that fall within the scope of this regulation.

CS ADR-DSN.A.005 Aerodrome Reference Code (ARC)

(a) An aerodrome reference code, consisting of a code number and letter which is selected for aerodrome planning purposes, shall be determined in accordance with the characteristics of the areophane for which an aerodrome facility is intended.

(b) The aerodrome reference code numbers and letters shall have the meanings assigned to them in Table CS-32.

(c) The code number for element 1 shall be determined from Table CS-34, by selecting the code number corresponding to the highest value of the aeroplane reference field lengths of the aeroplanes for which the runway is intended.

Note: The determination of the Aeroplane Reference Field Length is solely for the selection of a Code Number and is not intended to influence the actual runway length provided.

(d) The code letter for element 2 shall be determined from Table CS-35, by selecting the code letter which corresponds to the greatest wingspan of the aeroplanes for which the facility is intended.

Code element 1	
Code number	**Aeroplane reference field length**
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over

Code element 2	
	Wingspan
A	Up to but not including 15 m
B	15 m up to but not including 24 m
C	24 m up to but not including 36 m
D	36 m up to but not including 52 m
E	52 m up to but not including 65 m
F	65 m up to but not including 80 m

Table CS-36: Aerodrome Reference Code

GM1 ADR-DSN.A.005 Aerodrome Reference Code (ARC)

(a) The intent of the reference code is to provide a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome. The code is not intended to be used for determining runway length or pavement strength requirements. The code is composed of two elements which are related to the aeroplane performance characteristics and dimensions.

(b) Element 1 is a number based on the aeroplane reference field length, and element 2 is a letter based on the aeroplane wingspan. The code letter or number within an element selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided. When applying CS-ADR-DSN requirements , the aeroplanes which the aerodrome is intended to serve, are first identified and then the two elements of the code.

(c) In addition to the reference code, other aircraft characteristics, such as aircraft length and tail height, may also have an impact on the design of an aerodrome. Additionally, some characteristics of a piece of infrastructure are directly related to one element of the code (wingspan or wheel span) but are not impacted by other. The aerodrome designer should consider all the relationships between aircraft characteristics and aerodromes and piece of infrastructures characteristics.

(d) It is not intended that the specifications deriving from the Aerodrome Reference Code limit or regulate the operation of an aircraft.

(e) It is recognised that not all areas of the aerodrome should need to correspond to the critical aeroplane that determines the Aerodrome Reference Code. Elements of the aerodrome infrastructure that do not meet the requirements of the Aerodrome Reference Code for the design aeroplane should be designated with an appropriate code letter for its dimensions. Limitations should be identified to aircraft size permitted or operating limitations. ICAO, Annex 14 does not provide sufficient flexibility for infrastructure intended for different sizes of aircraft. It only addresses the 'design aircraft'. This enables all areas of the aerodrome to reflect the Aerodrome Reference Code.

(f) Further guidance on Aerodrome Reference Code and on planning for aeroplanes with wingspans greater than 80 m is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways, and Part 2, Taxiways, Aprons and Holding Bays.

Additional guidance on determining the runway length is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

(g) In the case of an aeroplane equipped with folding wing tips, its reference code letter may change as a result of the folding/extending of the wing tips. Consideration should be given to the wingspan configuration and resultant operations of the aeroplane at an aerodrome. Procedures on conducting an aerodrome compatibility study to accommodate aeroplanes with folding wing tips spanning two code letters are given in the PANS-Aerodromes (Doc 9981).

Further information concerning aeroplanes with folding wing tips, physical characteristics, and the concept of normal and non-normal operations can be found in the manufacturer's aircraft characteristics for airport planning .

CHAPTER B — RUNWAYS

CS ADR-DSN.B.015 Number, Siting and Orientation of Runways

(a) The number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is optimised taking into account that safety is not compromised.

(b) The siting and orientation of runways at an aerodrome should where possible, be such that the arrival and departure tracks minimise interference with areas approved for residential use and other noise sensitive areas close to the aerodrome in order to avoid future noise problems.

GM1 ADR-DSN.B.015 Number, Siting and Orientation of Runways

(a) In practice the number and orientation of runways at an aerodrome should normally be such that the usability factor of the aerodrome would normally be not less than 95 % for the aeroplanes that the aerodrome is intended to serve.

(b) Many factors affect the determination of the orientation, siting, and number of runways:

(1) The wind distribution (to minimise crosswinds liable to affect runways);

(i) Wind statistics used for the calculation of the usability factor are normally available in ranges of speed and direction, and the accuracy of the results obtained depends, to a large extent, on the assumed distribution of observations within these ranges. In the absence of any sure information as to the true distribution, it is usual to assume a uniform distribution since, in relation to the most favorable runway orientations, this generally results in a slightly conservative usability factor.

(ii) The maximum mean crosswind components given in CS ADR-DSN.B.020, refer to normal circumstances. There are some factors which may require that a reduction of those maximum values be taken into account at a particular aerodrome. These include:

1. the wide variations which may exist, in handling characteristics and maximum permissible crosswind components, among diverse types of aeroplanes (including future types) within each of the three groups given in CS ADR-DSN.B.020;

2. prevalence and nature of gusts;

3. prevalence and nature of turbulence;

4. the availability of a secondary runway;

5. the width of runways;

6. the runway surface conditions — water on the runway materially reduce the allowable crosswind component; and

7. the strength of the wind associated with the limiting crosswind component.

(2) The need to facilitate the provision of approaches conforming to the approach surface specifications, ensuring that obstacles in these areas or other factors should not restrict the operation of the aeroplanes for which the runway is intended. This may relate to individual obstacles or local geography (e.g. high ground).

(3) The need to minimise interference with areas approved for residential use and other noise-sensitive areas close to the aerodrome.

(4) The need to avoid the turbulence impacts of buildings on or close to the aerodrome.

(5) Type of operation. Attention should be paid in particular to whether the aerodrome is to be used in all meteorological conditions or only in visual meteorological conditions, and whether it is intended for use by day and night, or only by day.

(6) Topography of the aerodrome site, its approaches, and surroundings, particularly:

(i) compliance with the obstacle limitation surfaces;

(ii) current and future land use. The orientation and layout should be selected so as to protect as far as possible, the particularly sensitive areas, such as residential, school and hospital zones, from the discomfort caused by aircraft noise. Detailed information on this topic is provided in ICAO Doc 9184, Airport Planning Manual, Part 2, Land Use and Environmental Control and in ICAO Doc 9829, Guidance on the Balanced Approach to Aircraft Noise Management;

(iii) current and future runway lengths to be provided;

(iv) construction costs; and

(v) possibility of installing suitable non-visual and visual aids for approach-to-land.

(7) Air traffic in the vicinity of the aerodrome, particularly:

(i) proximity of other aerodromes or ATS routes;

(ii) traffic density; and

(iii) air traffic control and missed approach procedures.

(c) The number of runways to be provided in each direction depends on the number of aircraft movements to be catered for.

(d) Whatever the factors that determine the runway orientation, the siting, and orientation of runways at an aerodrome should where possible, be such that safety is optimised.

(e) One important factor is the usability factor, as determined by the wind distribution which is specified hereunder. Another important factor is the alignment of the runway to facilitate the provision of approaches conforming to the approach surface specifications in CS ADR- DSN.H.425. Further guidance on these and other factors is given in ICAO Annex 14, Attachment A, Section 1.

(f) When a new instrument runway is being located, particular attention needs to be given to areas over which aeroplanes should be required to fly when following instrument approach and missed approach procedures so as to ensure that obstacles in these areas or other factors should not restrict the operation of the aeroplanes for which the runway is intended.

(g) Guidance on how to address noise problems is provided in the Airport Planning Manual (Doc 9184), Part 2, and in Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829).

CS ADR-DSN.B.020 Choice of maximum permissible crosswind components

In the application of CS ADR-DSN.B.015- Number, Siting and Orientation of Runways and GM1 ADR-DSN. B.015(a), it should be assumed that landing or take-off of aeroplane is, in normal circumstances, precluded when the crosswind component exceeds:

(a) 37 km/h (20 kt) in the case of aeroplanes whose reference field length is 1 500 m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a crosswind component not exceeding 24 km/h (13 kt) should be assumed;

(b) 24 km/h (13 kt) in the case of aeroplanes whose reference field length is 1 200 m or up to but

not including 1 500 m; and

(c) 19 km/h (10 kt) in the case of aeroplanes whose reference field length is less than 1200 m.

CS ADR-DSN.B.025 Data to be used

The selection of data to be used for the calculation of the usability factor should be based on reliable wind distribution statistics that extend over as long a period as possible, preferably of not less than five years. The observations used should be made at least eight times daily and spaced at equal intervals of time.

GM1 ADR-DSN.B.025 Data to be used

These winds are mean winds. Reference to the need for some allowance for gusty conditions is made in ICAO Annex 14, Attachment A, Section 1.

CS ADR-DSN.B.030 Runway Threshold

(a) A threshold should normally be located at the extremity of a runway unless operational considerations justify the choice of another location.

(b) When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, account should be taken of the various factors which may have a bearing on the location of the threshold.

(c) When the threshold is displaced, the threshold location shall be measured at the inner edge of the threshold marking (the transverse stripe across the runway).

(d) Where this displacement is due to an unserviceable runway condition, a cleared and graded area of at least 60 m in length should be available between the Unserviceable Area and the displaced threshold. Additional distance should also be provided to meet the requirements of the Runway End Safety Area as appropriate.

GM1 ADR-DSN.B.030 Runway Threshold

(a) Guidance Material on the survey requirements for aerodromes is provided in the ICAO World Geodetic system – 1984 (WGS-84) Manual, notably in Section 5.3. However, this guidance does not accurately define the survey locations for the runway edge or the runway threshold because, in both cases, the measurement point is not the centre of the relevant paint marking.

(b) Location of threshold:

(1) The threshold is normally located at the extremity of a runway if there are no obstacles penetrating above the approach surface. In some cases, however, due to local conditions it

may be desirable to displace the threshold permanently (see below). When studying the location of a threshold, consideration should also be given to the height of the ILS reference datum, and/or MLS approach reference datum, and the determination of the obstacle clearance limits. Specifications concerning the height of the ILS reference datum and MLS approach reference datum are given in ICAO Annex 10, Volume I;

(2) In determining that no obstacles penetrate above the approach surface, account should be taken of mobile objects (vehicles on roads, trains, etc.) at least within that portion of the approach area within 1 200 m longitudinally from the threshold and of an overall width of not less than 150 m.

(c) Displaced threshold:

(1) If an object extends above the approach surface and the object cannot be removed, consideration should be given to displacing the threshold permanently.

(2) To meet the obstacle limitation objectives of the certification specifications prescribed in Chapter H, the threshold should ideally be displaced down the runway for the distance necessary to provide that the approach surface is cleared of obstacles.

(3) However, displacement of the threshold from the runway extremity should inevitably cause reduction of the landing distance available, and this may be of greater operational significance than penetration of the approach surface by marked and lighted obstacles. A decision to displace the threshold, and the extent of such displacement, should, therefore, have regard to an optimum balance between the considerations of clear approach surfaces and adequate landing distance. In deciding this question, account should be taken of the types of aeroplanes which the runway is intended to serve, the limiting visibility and cloud base conditions under which the runway should be used, the position of the obstacles in relation to the threshold and extended centre line, and, in the case of a precision approach runway, the significance of the obstacles to the determination of the obstacle clearance limit.

(4) Notwithstanding the consideration of landing distance available, the selected position for the threshold should not be such that the obstacle-free surface to the threshold is steeper than 3.3 % where the code number is 4 or steeper than 5 % where the code number is 3.

(5) In the event of a threshold being located according to the criteria for obstacle-free

surfaces in the preceding paragraph, the obstacle marking requirements of Chapter Q should continue to be met in relation to the displaced threshold.

(6) Depending on the length of the displacement, the RVR at the threshold could differ from that at the beginning of the runway for take-offs. The use of red runway edge lights with photometric intensities lower than the nominal value of 10 000 cd for white lights increases that phenomenon.

CS ADR-DSN.B.035 Length of runway and runway and declared distances

(a) Primary Runway

Except as provided in CS ADR-DSN.B.040 -Runways with stopways or clearways, the actual runway length to be provided for a primary runway should be adequate to meet the operational requirements of the aircraft for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aircraft.

(b) Secondary Runway

The length of a secondary runway should be determined similarly to primary runways except that it needs only to be adequate for those aeroplanes which require to use that secondary runway in addition to the other runway or runways in order to obtain a Usability Factor of at least 95 per cent.

(c) The following distances shall be calculated to the nearest meter for each runway:

(1) Take-off run available;

(2) Take-off distance available;

(3) Accelerate-stop distance available; and

(4) Landing distance available.

(d) The length of the runway is measured from the start of the runway pavement or where a transverse stripe marking is provided to indicate threshold displacement, at the inner edge of the transverse stripe across the runway.

GM1 ADR-DSN.B.035 Length of runway and declared distances

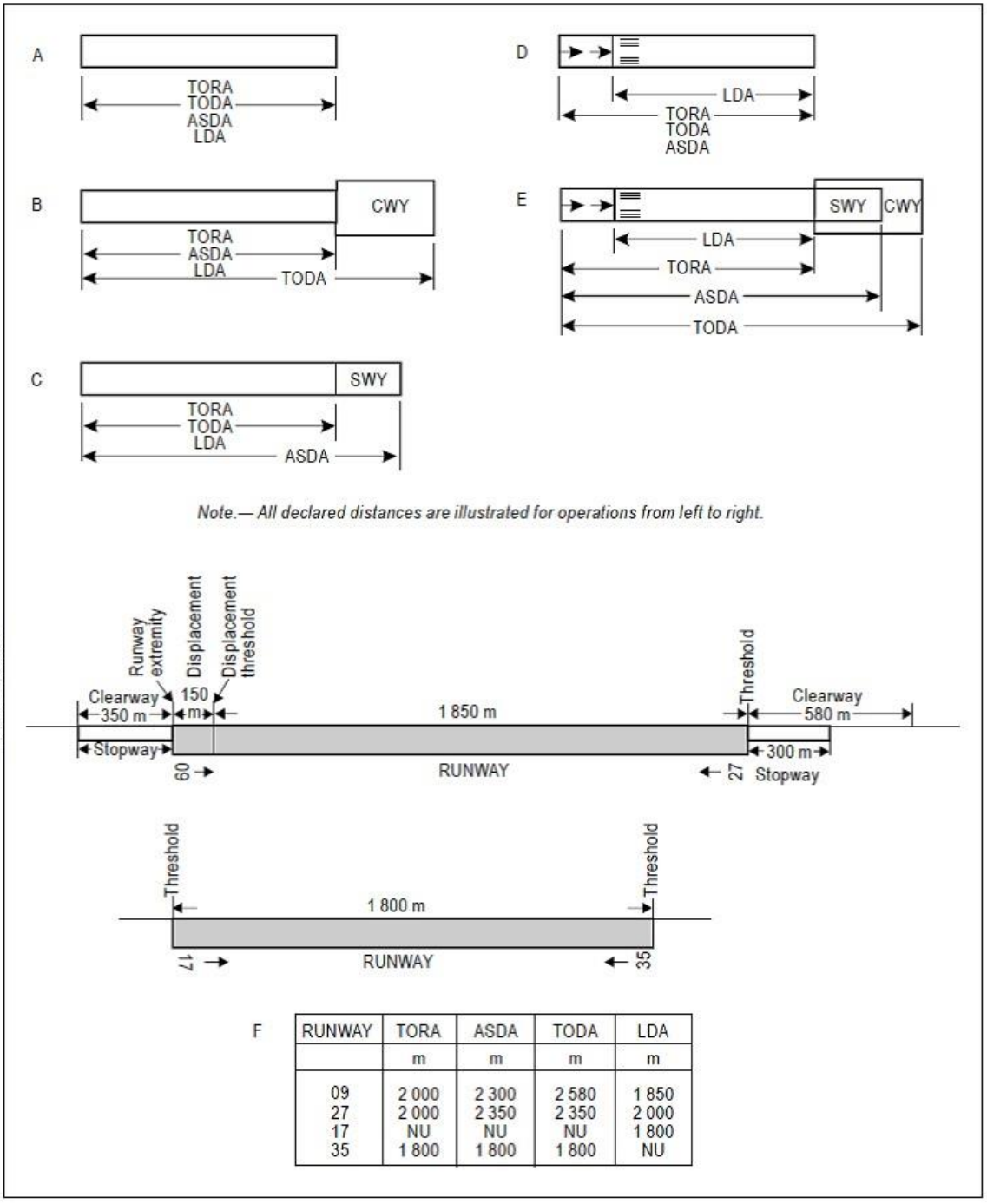
(a) Length of the runway:

(1) This specification does not necessarily mean providing for operations by the critical aeroplane at its maximum mass.

(2) Both take-off and landing requirements need to be considered when determining the length of runway to be provided and the need for operations to be conducted in both directions of the runway.

(3) Local conditions that may need to be considered include elevation, temperature, runway slope, humidity, and the runway surface characteristics.

(4) When performance data on aeroplanes for which the runway is intended, are not known, guidance on the determination of the actual length of a primary runway by application of general correction factors is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.



F

RUNWAY	TORA	ASDA	TODA	LDA
	m	m	m	m
09	2 000	2 300	2 580	1 850
27	2 000	2 350	2 350	2 000
17	NU	NU	NU	1 800
35	1 800	1 800	1 800	NU

Figure CS-38: Illustration of declared distances

CS ADR-DSN.B.040 Runways with stopways or clearways

(a) The length(s) of a stopway or clearway, where provided, should be of adequate distance to meet the operational requirements for the aircraft which the runway is intended to serve.

(b) Where a runway is associated with a stopway or clearway, an actual runway length less than that resulting from application of CS ADR-DSN.B.035 as appropriate, may be considered satisfactory but, in such a case, any combination of runway, stopway, and clearway provided should permit compliance with the operational requirements for take-off and landing of the aeroplanes the runway is intended to serve.

GM1 ADR-DSN.B.040 Runways with stopways and clearways

Guidance on use of stopway and clearway is given in ICAO Annex14, Attachment A, Section 2.

CS ADR-DSN.B.045 Width of runways

(a) The width of a runway shall be not less than the appropriate dimension specified in the Table below.

Code number	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
1[a]	18 m	18 m	23 m	—
2[a]	23 m	23 m	30 m	—
3	30 m	30 m	30 m	45 m
4	—	—	45 m	45 m
[a] the width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.				

Table CS-37 : Width of the Runway

(b) The width of the runway shall be measured at the outside edge of the runway side stripe marking where provided, or the edge of the runway.

(c) When new or rehabilitated runways are planned, then each shall be designed based on the Aerodrome Reference Code for the largest aircraft type intended to operate.

GM1 ADR-DSN.B.045 Width of runways

(a) The combinations of code numbers and OMGWSs for which widths are specified have been developed for typical aeroplane characteristics.

(b) Factors affecting runway width are given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

(c) See CS ADR-DSN.B.125 to CS ADR-DSN.B.145 concerning the provision of runway shoulders, in particular for code F aeroplanes with four (or more) engines.

CS ADR-DSN.B.050 Minimum distance between parallel non-instrument runways

Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines shall be:

(a) 210 m where the higher code number is 3 or 4;

(b) 150 m where the higher code number is 2; and

(c) 120 m where the higher code number is 1.

GM1 ADR-DSN.B.050 Minimum distances between parallel non-instrument runways

(a) Except that for independent parallel approaches, combinations of minimum distances and associated conditions other than those specified in the PANS-ATM (Doc 4444) may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

(b) Procedures for wake turbulence categorisation of aircraft and wake turbulence separation minima are contained in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM), Doc 4444, Chapter 4, 4.9 and Chapter 5, 5.8, respectively.

CS ADR-DSN.B.055 Minimum distances between parallel instrument runways

(a) Where parallel instrument runways are intended for simultaneous use, the minimum distance between their centre lines shall not be less than:

(1) 1,035 m for independent parallel approaches;

(2) 915 m for dependent parallel approaches;

(3) 760 m for independent parallel departures; and

(4) 760 m for segregated parallel operations.

(b) Apart from the requirement provided in (a) above, for segregated parallel operations the specified minimum distance:

(1) may be decreased by 30 m for each 150 m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and

(2) shall be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft.

(c) Other combinations of minimum distances should apply taking into account ATM and operational aspects.

GM1 ADR-DSN.B.055 Minimum distance between parallel instrument runways

(a) For independent parallel approaches, combinations of minimum distances and associated conditions other than those specified in the PANS-ATM (Doc 4444) may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

(b) Guidance on procedures and facilities requirements for simultaneous operations on parallel or near- parallel instrument runways are contained in ICAO, PANS-ATM, Doc 4444, Chapter 6 and ICAO, PANS- OPS, Doc 8168, Volume I, Part III, Section 2, and Volume II, Part I, Section 3; Part II, Section 1; and Part III, Section 3, and relevant guidance is contained in ICAO Doc, 9643, Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR).

CS ADR-DSN.B.060 longitudinal slopes of runways

The safety objective of limiting the longitudinal runway slope is to enable stabilized and safe use of runway by an aircraft.

(a) The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:

(1) 1 % where the code number is 3 or 4; and

(2) 2 % where the code number is 1 or 2.

(b) Along no portion of a runway should the longitudinal slope exceed:

(1) 1.25 % where the code number is 4, except that for the first and last quarter of the length of the runway where the longitudinal slope should not exceed 0.8 %;

(2) 1.5 % where the code number is 3, except that for the first and last quarter of the length of

a precision approach runway Category II or III where the longitudinal slope should not exceed 0.8 %; and

(3) 2 % where the code number is 1 or 2.

GM1 ADR-DSN.B.060 Longitudinal slopes on runways

Slopes should be so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft. For precision approach runways, slopes in a specified area from the runway end, and including the touchdown area, should be designed so that they should correspond to the characteristics needed for such type of approach.

CS ADR-DSN.B.065 Longitudinal slopes changes on runways

The safety objective of limiting the longitudinal runway slope changes is to avoid damage of aircraft and to enable safe use of runway by an aircraft.

(a) Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed:

(1) 1.5 % where the code number is 3 or 4; and

(2) 2 % where the code number is 1 or 2.

(b) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(1) 0.1 % per 30 m (minimum radius of curvature of 30 000 m) where the code number is 4;

(2) 0.2 % per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and

(3) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

GM1 ADR-DSN.B.065 Longitudinal slopes changes on runways

(a) Slope changes are so designed as to reduce dynamic loads on the undercarriage system of the aeroplane. Minimising slope changes is especially important on runways where aircraft move at high speeds.

(b) For precision approach runways, slopes in a specified area from the runway end, and including the touchdown area, are so designed that they should correspond to the characteristics needed for such type of approach.

CS ADR-DSN.B.070 Sight distance for slopes on runways

(a) The safety objective of minimum runway sight distance values is to achieve the necessary visibility to enable safe use of runway by an aircraft.

(b) Where slope changes on runways cannot be avoided, they should be such that there should be an unobstructed line of sight from:

(1) any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D, E, or F;

(2) any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and

(3) any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.

GM1 ADR-DSN.B.070 Sight distance for slopes of runways

(a) Runway longitudinal slopes and slopes changes are so designed that the pilot in the aircraft has an unobstructed line of sight over all or as much of the runway as possible, thereby enabling the pilot to see aircraft or vehicles on the runway, and to be able to manoeuvre and take avoiding action.

(b) Consideration will have to be given to providing an unobstructed line of sight over the entire length of a single runway where a full-length parallel taxiway is not available. Where an aerodrome has intersecting runways, additional criteria on the line of sight of the intersection area needs to be considered for operational safety. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

CS ADR-DSN.B.075 Distance between slope changes on runways

Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:

(a) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:

(1) 30,000 m where the code number is 4;

(2) 15,000 m where the code number is 3; and

(3) 5,000 m where the code number is 1 or 2; or

(b) 45 m;

whichever is greater.

GM1 ADR-DSN.B.075 Distance between slope changes on runways

The following example illustrates how the distance between slope changes is to be determined (see Figure CS-38):

D for a runway where the code number is 3 should be at least:

15 000 ($|x - y| + |y - z|$) m

$|x - y|$ being the absolute numerical value of $x - y$

$|y - z|$ being the absolute numerical value of $y - z$

Assuming $x = +0.01$

$y = -0.005$

$z = +0.005$

then $|x - y| = 0.015$ then

$|y - z| = 0.01$

To comply with the specifications, D should be not less than: 15 000 (0.015 + 0.01) m,

that is, 15 000 × 0.025 = 375 m

When a runway is planned that should combine the extreme values for the slopes and changes in slope permitted, as prescribed in CS DR-DSN.B.060- Longitudinal slopes on runways to CS ADR-DSN.B.080- Transverse slopes on runways, a study should be made to ensure that the resulting surface profile should not hamper the operation of aeroplanes.

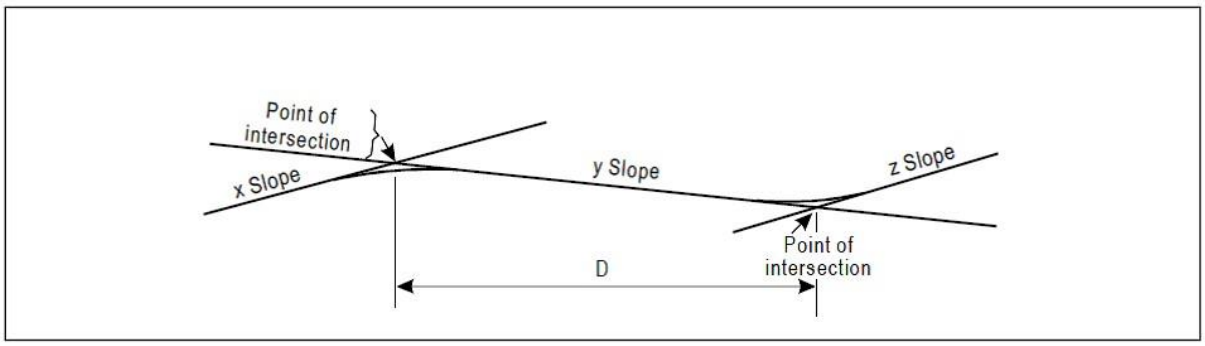


Figure CS-39: profile on centre line of runway

CS ADR-DSN.B.080 Transverse slopes on runways

(a) The safety objective of runway transverse slopes is to promote the most rapid drainage of water from the runway.

(b) To promote the most rapid drainage of water, the runway surface should be cambered, except where a single cross fall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage. The transverse slope should be:

(1) not less than 1 % and not more than 1.5 % where the code letter is C, D, E or F; and;

(2) not less than 1 % and not more than 2 % where the code letter is A or B;

Except at runway or taxiway intersections where flatter slopes may be necessary.

(c) For a cambered surface, the transverse slope on each side of the centre line shall be symmetrical.

(d) The transverse slope should be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

GM1 ADR-DSN.B.080 Transverse slopes on runways

(a) The slopes on a runway are intended to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). The water (or possible fluid contaminant) evacuation is facilitated by an adequate combination of longitudinal and transverse slopes, and may also be assisted by grooving the runway surface.

(b) On wet runways with crosswind conditions the problem of aquaplaning from poor drainage is apt to be accentuated. In ICAO Annex 14, Volume 1, Attachment A, Section 7, information is given concerning these problem and other relevant factors.

CS ADR-DSN.B.085 Runway strength

The runway should be of sufficient strength to support normal operations of the most demanding aircraft without risk of damage either to the aeroplane or the runway.

GM1 ADR-DSN.B.085 Runway strength

Additional information on the bearing strength, the design and evaluation of pavements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

CS ADR-DSN.B.090 Surface of runway

(a) The surface of a runway shall be constructed without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane.

(b) A paved runway shall be so constructed or resurfaced as to provide surface friction characteristics at or above the minimum friction level.

(c) The average surface texture depth of a new surface should be not less than 1.0 mm.

(d) When the surface is grooved or scored, the grooves or scorings shall be either perpendicular to the runway centre line or parallel to non-perpendicular transverse joints where applicable.

(e) Measurements of the friction characteristics of a new or resurfaced paved runway shall be made with a continuous friction measuring device using self-wetting features.

GM1 ADR-DSN.B.090 Surface of runways

(a) Surface irregularities may adversely affect the take-off or landing of an aeroplane by causing excessive bouncing, pitching, vibration, or other difficulties in the control of an aeroplane.

(b) In adopting tolerances for runway surface irregularities, the following standard of construction is achievable for short distances of 3 m and conform to good engineering practice: except across the crown of a camber or across drainage channels, the finished surface of the wearing course is to be of such regularity that when tested with a 3 m straight-edge placed anywhere in any direction on the surface, there is no deviation greater than 3 mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight-edge.

(c) Caution should also be exercised when inserting runway lights or drainage grilles in runway surfaces to ensure that adequate smoothness of the surface is maintained.

(d) Additional guidance and guidance on design tolerances on surface of runways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

(e) Macrotexture and microtexture should be taken into consideration in order to provide the required surface friction characteristics. Additional guidance is given in GM1 ADR-DSN.B.191. Additional guidance on design and methods for improving runway surface texture is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

(f) The surface of a paved runway should be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

(g) Guidance on methods used to measure surface texture is given in the Airport Services Manual (Doc 9137), Part 2.

(h) For further guidance refer to ICAO Doc 9137 Part 2.

CS ADR-DSN.B.095 Runway turn pads

(a) The safety objective of the runway turn pad is to facilitate a safe 180-degree turn by aeroplanes on runway ends that are not served by a taxiway or taxiway turnaround.

(b) Where the end of a runway is not served by a taxiway or a taxiway turnaround, and if required, a runway turn pad shall be provided to facilitate a 180-degree turn of aeroplanes.

(c) The runway turn pad may be located on either the left or right side of the runway and adjoining the runway pavement at both ends of the runway and at some intermediate locations where deemed necessary.

(d) The intersection angle of the runway turn pad with the runway shall not exceed 30 degrees.

(e) The nose wheel steering angle to be used in the design of the runway turn pad should not exceed 45 degrees.

(f) The design of a runway turn pad shall be such that when the cockpit of the most demanding aircraft for which the turn pad is intended remains over the turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the turn pad shall be not less than that given by the following table:

Clearance	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
	1.50 m	2.25 m	3 m[a] or 4 m[b]	4 m
[a] *if the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m.* [b] *if the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18*				
Note: Wheel base means the distance from the nose gear to the geometric centre of the main gear.				

Table CS-38: Outer Main Gear clearances- Turn pads

GM1 ADR-DSN.B.095 Turn pads

Where severe weather conditions and resultant lowering of surface friction characteristics prevail, a larger wheel-to-edge clearance should be provided.

(a) A typical runway turn pad layout is presented in Figure B-3 below. The initiation of the turn would be facilitated by locating the turn pad on the left side of the runway, since the left seat is the normal position of the pilot-in-command.

(b) Such areas, if provided along a runway, may also be useful to reduce taxiing time and distance for aeroplanes which may not require the full length of the runway.

(c) Additional guidance on the design of runway turn pads is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways. Guidance on taxiway turnaround as an alternate facility is available in the Aerodrome Design Manual (Doc 9157), Part 2.

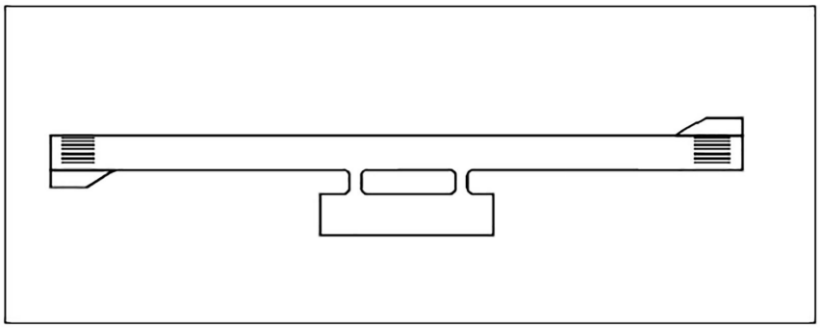


Figure CS-40 Typical turn pad layout

CS ADR-DSN.B.100 Slopes on runway turn pads

The longitudinal and transverse slopes on a runway turn pad should be sufficient to prevent the accumulation of water on the surface and facilitate rapid drainage of surface water. The slopes should be the same as those on the adjacent runway pavement surface.

GM1 CS ADR-DSN.B.100

Slopes should be so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft.

CS ADR-DSN.B.105 Strength of runway turn pads

The strength of a runway turn pad shall be at least equal to that of the adjoining runway which it serves, due consideration being given to the fact that the turn pad will be subjected to slow-moving traffic making

hard turns and consequent higher stresses on the pavement.

GM1 CS ADR-DSN.B.105 Strength of runway turn pads

(a) Where a runway turn pad is provided with flexible pavement, the surface would need to be capable of withstanding the horizontal shear forces exerted by the main landing gear tires during turning manoeuvres.

CS ADR-DSN.B.110 Surface of runway turn pads

(a) The surface of a runway turn pad shall not have surface irregularities that may cause damage to an aircraft using the turn pad.

(b) The surface of a runway turn pad should be so constructed or resurfaced as to provide surface friction characteristics at least equal to that of the adjoining runway.

CS ADR-DSN.B.115 Width of shoulders of runway turn pads

The runway turn pads should be provided with shoulders of such width as is necessary to prevent surface erosion by the jet blast of the most demanding aeroplane for which the turn pad is intended and any possible foreign object damage to the aeroplane engines.

GM1 ADR-DSN.B.115 Width of shoulders for runway turn pads

As a minimum, the width of the shoulders would need to cover the outer engine of the most demanding aeroplane and thus may be wider than the associated runway shoulders.

CS ADR-DSN.B.120 Strength of shoulders for runway turn pads

The strength of runway turn pad shoulders should be capable of withstanding the occasional passage of the most demanding aircraft it is designed to serve without inducing structural damage to the aircraft and to the supporting ground vehicles that may operate on the shoulder.

CS ADR-DSN.B.125 Runway shoulders

(a) The safety objective of a runway shoulder is that it should be so constructed as to mitigate any hazard to an aircraft running off the runway or stopway or to avoid the ingestion of loose stones or other objects by turbine engines.

(b) Runway shoulders shall be provided for a runway where the code letter is D, E or F, for aeroplanes with an OMGWS from 9 m up to but not including 15 m.

GM1 CS ADR-DSN.B.125 Runway shoulders

(a) Runway shoulders should be considered because strong crosswinds may result in significant deviation from the runway centre line. In the case of some large aircraft, the wing-mounted engines may overhang the runway edge and there is a risk of jet blast eroding the surface adjacent to the runway. This can cause dust and the possible ingestion of debris by the engines.

(b) Mitigation measures that can be considered are to provide the runway with inset runway edge lights (in lieu of elevated lights, to protect aeroplane from ingestion) and additional runway centre line guidance.

(c) Further guidance on runway shoulders is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

CS ADR-DSN.B.130 Slopes on runway shoulders

(a) The safety objective of runway shoulder transverse slopes is to promote the most rapid drainage of water from the runway and runway shoulder.

(b) The surface of the shoulder that abuts the runway shall be flush with the surface of the runway and its transverse slope should not exceed 2.5 %.

CS ADR-DSN.B.135 Width of runway shoulders

For aeroplanes with an OMGWS from 9 m up to but not including 15 m the runway shoulders shall extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:

(a) 60 m where the code letter is D or E;

(b) 60 m where the code letter is F with two- or three-engine aeroplanes; and

(c) 75 m where the code letter is F with four (or more) engine aeroplanes.

CS ADR-DSN.B.140 Strength of runway shoulders

The portion of a runway shoulder between the runway edge and a distance of 30 m from the runway centre line shall be prepared or constructed so as to be capable, in the event of an aeroplane running off the runway, of supporting the aeroplane without inducing structural damage to the aeroplane and of supporting ground vehicles which may operate on the shoulder.

GM1 CS ADR-DSN.B.140 Strength of runway shoulders

(a) Runway shoulders should be so prepared as to be capable of supporting the aeroplanes using the runway without causing structural damage to those aeroplanes. They should also be capable of supporting vehicles such as firefighting appliances. In some cases, whilst the bearing strength of the natural ground may be sufficient, special preparation may be necessary to avoid erosion and the possible ingestion of debris by engines.

(b) Guidance on characteristics and treatment of runway shoulders:

(1) The shoulder of a runway or stopway should be prepared or constructed so as to support an aeroplane and minimise any hazard to an aeroplane running off the runway or stopway. Some guidance is given in the following paragraphs on certain special problems which may arise, and on further measures to avoid the ingestion of loose stones or other objects by turbine engines.

(2) In some cases, the bearing strength of the natural ground in the strip may be sufficient, without special preparation, to meet the requirements for shoulders. Where special preparation is necessary, the method used should depend on local soil conditions and on the mass of the aeroplanes the runway is intended to serve. Soil tests should help in determining the best method of improvement (e.g. drainage, stabilisation, surfacing and light paving).

(c) Attention should also be paid when designing shoulders to prevent the ingestion of stones or other objects by turbine engines. Similar considerations apply here to those discussed for the margins of taxiways both as to the special measures that may be necessary and as to the distance over which such special measures, if required, should be taken. Further guidance is

given in ICAO Doc 9157, Aerodrome Design Manual, Part 1 Runways, and Part 2, Taxiways, Aprons and Holding Bays.

(d) Where shoulders have been treated specially, either to provide the required bearing strength or to prevent the presence of stones or debris, difficulties may arise because of a lack of visual contrast between the runway surface and that of the adjacent strip. Such difficulties can be overcome either by providing a good visual contrast between the surfacing of the runway and of the strip, or by providing a runway side stripe marking.

(e) Additional guidance on strength of runway shoulders is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

CS ADR-DSN.B.145 Surface of runway shoulders

(a) The surface of a runway shoulder shall be prepared or constructed so as to resist erosion and prevent the ingestion of the surface material by aeroplane engines.

(b) Runway shoulders for code letter F aeroplanes shall be paved to a minimum overall width of runway and shoulder of not less than 60 m.

CS ADR-DSN.B.150 Runway strip to be provided

(a) The safety objective of the runway strip is to reduce the risk of damage to an aircraft accidentally running off the runway, to protect aircraft flying over it when taking-off or landing, and to enable safe use by rescue and firefighting (RFF) vehicles.

(b) A runway and any associated stopways shall be included in a strip.

GM1 ADR-DSN.B.150 Runway strip to be provided

(a) runway strip extends laterally to a specified distance from the runway centre line, longitudinally before the threshold, and beyond the runway end. It provides an area clear of

objects that may endanger aeroplanes. Any equipment or installation required for air navigation or for aircraft safety purposes and is located in this object-free area should be frangible and mounted as low as possible. The term ‘aircraft safety purposes’ refers to the installation of arresting systems.re

(b) When the threshold or end of the landing distance do not coincide with the ends of a runway, the runway strip enclosing the runway and any associated stopway should extend to the lengths specified in CS ADR-DSN.B.155 and the widths specified in CS ADR-DSN.B.160, based on the

threshold, end of landing distance or end of stopway, as appropriate.

CS ADR-DSN.B.155 length of runway strip

(a) Except for a runway starter extension, a strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

(1) 60 m where the code number is 2, 3 , or 4;

(2) 60 m where the code number is 1 and the runway is an instrument one; and

(3) 30 m where the code number is 1 and the runway is a non-instrument one.

(b) Where a runway starter extension is provided, a strip shall extend before the end of a starter extension for the distance specified in CS ADR-DSN. D. 315- width of taxiway strips.

CS ADR-DSN.B.160 Width of runway strip

(a) A strip including a precision approach runway shall extend laterally to a distance of at least:

(1) 140 m where the code number is 3 or 4; and

(2) 70 m where the code number is 1 or 2;

(b) on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(c) A strip including a non-precision approach runway shall extend laterally to a distance of at least:

(1) 140 m where the code number is 3 or 4; and

(2) 70 m where the code number is 1 or 2;

on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(d) A strip including a non-instrument runway shall extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1.

CS ADR-DSN.B.165 Objects on runway strips

(a) An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

(b) No fixed object, other than visual aids required for air navigation or those required for aircraft safety purposes and which must be sited on the runway strip, and satisfying the relevant frangibility requirement shall be permitted on any part of a runway strip of a precision approach runway delineated by the lower edges of the inner transitional surfaces.

(c) No mobile object shall be permitted on this part of the runway strip during the use of the runway for landing or take-off.

(d) To eliminate a buried vertical surface on objects situated on a graded portion of the runway strip, a slope shall be provided to minimise hazards to aeroplanes running off the runway.

GM1 ADR-DSN.B.165 Objects on runway strips

(a) Within the graded portion of the runway strip, measures should be taken to prevent an aircraft's wheel when sinking into the ground, from striking a hard-vertical face. Special problems may arise for runway light fittings or other objects mounted in the strip or at the intersection with a taxiway or another runway.

(b) In the case of constructions within the graded portion of the runway strip, such as intersecting runways or taxiways, where the surface should also be flush with the strip surface, they should be delethalised, that is, so constructed as to avoid presenting a buried vertical face to aircraft wheels in soft ground conditions in any direction from which an aircraft is likely to approach.

(c) A vertical face can be eliminated by chamfering from the top of those constructions to not less than 30 cm below the strip surface level. Other objects situated within the graded portion of the runway strip, the functions of which do not require them to be at surface level, should be buried to a depth of not less than 30 cm.

(d) Where this is not feasible, to eliminate a buried vertical surface, a slope should be provided which extends from the top of the construction to not less than 30 cm below ground level. The slope can be created by using a mixture of compacted gravel or asphalt or crushed aggregates and soil.

(e) Consideration should be given to the location and design of drains on a runway strip to prevent damage to an aeroplane accidentally running off a runway. Suitably designed drain covers may be

required. For further guidance, see the Aerodrome Design Manual (Doc 9157), Part 1.

(f) Where open-air or covered storm water conveyances are installed, consideration should be given in order to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

(g) Particular attention needs to be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, in particular birds. The open-air storm water conveyance may be covered by a net, if required. Further guidance is given in ICAO Doc 9137, Airport Services Manual, Part 3, Wildlife Control and Reduction.

(h) The term 'aircraft safety purposes' refers to the installation of arresting systems;

CS ADR-DSN.B.175 Grading of runway strips

(a) That portion of a strip of an instrument non-precision runway within a distance of at least75 m where the code number is 3 or 4 from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(b) That portion of a strip of a precision approach runway within a distance of at least 105 m , where the code number is 3 or 4 from the centre line of the runway as shown in Fig CS-40 shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(c) That portion of a strip of an Instrument Runway within a distance of at least 40 m where the Code Number is 1 or 2 from the centre line of the runway and its extended centre line shall provide a graded area for aircraft which the runway is intended to serve in the event of an aeroplane running off the runway.

(d) That portion of a strip of a non-instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(e) The surface of that portion of a strip that abuts a runway, shoulder, or stopway shall be flush with the surface of the runway, shoulder, or stopway.

(f) That portion of a strip to at least 30 m before the start of a runway shall be prepared against blast erosion in order to protect a landing aeroplane from the danger of an exposed edge. Where this area is a paved surfaces, they shall be able to withstand the occasional passage of the critical aeroplane for runway pavement design.

(g) Within the graded area of the runway strip, constructions such as plinths, runway ends, paved taxiway edges, etc. shall be delethalised, that is, so constructed as to avoid presenting a buried vertical face to aircraft wheels in soft ground conditions in any direction from which an aircraft is likely to approach. To eliminate a buried vertical surface, a slope shall be provided which extends from the top of the construction to not less than 0.3 m below ground level. The slope shall be no greater than 1:10.

GM1 ADR-DSN.B.175 Grading of runway strips

(a) For a precision approach runway, where the code number is 3 or 4, it may be desirable a greater width of that portion of a strip to be graded should be considered. Figure CS-40 shows the shape and dimensions of a wider strip that may be considered for such a runway. This strip has been designed using information on aircraft running off runways. The portion to graded extends to a distance of 105 m from the centre line, except that the distance is gradually reduced to 75 m from the centre line at both ends of the strip, for a length of 150 m from the runway end.

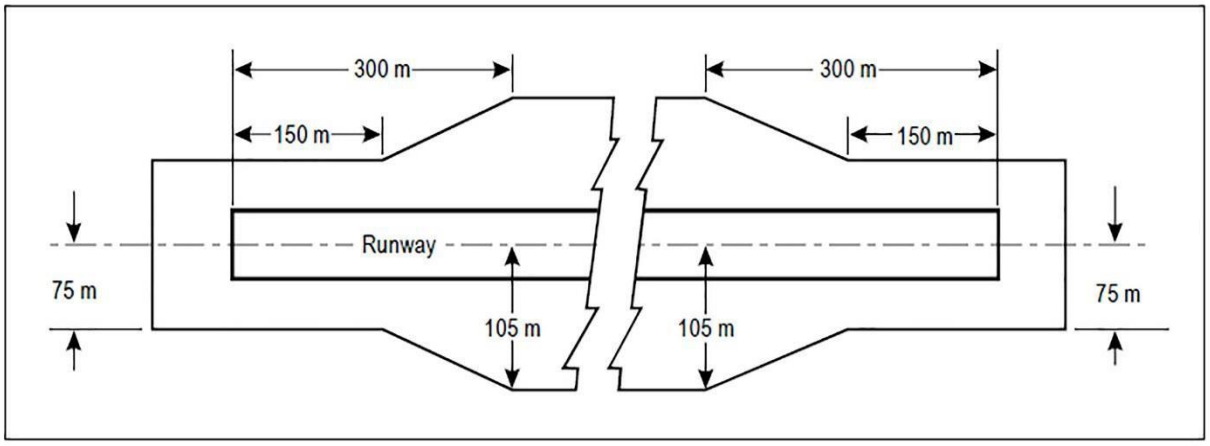


Figure CS-41: Graded portion of a strip including a precision approach runway where the code number is 3 or 4

(b) Additional guidance on grading is given in ICAO Doc 9157, Aerodrome Design Manual Part 1, Runways.

(c) The area adjacent to the end of a runway provided to reduce the erosive effects of jet blast and propeller wash may be referred to as a blast pad.

(d) Guidance on protection against aeroplane engine blast is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2.

CS ADR-DSN.B.180 Longitudinal slopes on runway strips

(a) The safety objective of longitudinal runway strip slope is to define maximum gradient values that should not interfere with the safe use of the runway strip by an aircraft.

(b) A longitudinal slope along that portion of a strip to be graded shall not exceed:

(1) 1.5 % where the code number is 4;

(2) 1.75 % where the code number is 3; and

(3) 2 % where the code number is 1 or 2.

(c) Longitudinal slope changes on that portion of a strip to be graded shall be as gradual as practicable, and abrupt changes or sudden reversals of slopes should be avoided.

CS ADR-DSN.B.185 Transverse slopes on runway strips

(a) Transverse slopes on that portion of a strip to be graded shall be adequate to prevent the accumulation of water on the surface but should not exceed:

(1) 2.5 % where the code number is 3 or 4; and

(2) 3 % where the code number is 1 or 2;

except that to facilitate drainage from the slope for the first 3 m outward from the runway, shoulder or stopway edge should be negative as measured in the direction away from the runway and may be as great as 5 %.

(b) The transverse slopes of any portion of a strip beyond that to be graded should not exceed an upward slope of 5 % as measured in the direction away from the runway.

GM1 ADR-DSN.B.185 Transverse slopes on runway strips

(a) Where required for proper drainage, an open-air storm water conveyance may be allowed in

the non-graded portion of a runway strip and should be placed as far as practicable from the runway.

(b) The aerodrome RFF procedure should take into account the location of open-air storm water conveyances within the non-graded portion of a runway strip.

CS ADR-DSN.B.190 Strength of runway strips

(a) That portion of a strip of an instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4; and

(2) 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line shall be so prepared or constructed so as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(b) That portion of a strip containing a non-instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line should be prepared or constructed so as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

GM1 ADR-DSN.B.190 Strength of runway strips

(a) Since the graded portion of a strip is provided to minimise the hazard to an aircraft running off the runway, it should grant sufficient strength in such a manner as to prevent the collapse of the nose landing gear of the aircraft. The surface should be prepared in such a manner as to provide drag to an aircraft and below the surface, it should have sufficient bearing strength to avoid damage to the aircraft.

(b) To meet these divergent needs, the following guidelines are provided for preparing the strip. It is noted, that a depth of 15 cm is a depth to which the nose gear may sink without collapsing. Therefore, it is recommended that the soil at a depth of 15 cm below the finished strip surface

should be prepared to have a sufficient stability, demonstrated by bearing strength of California Bearing Ratio (CBR) value of 15 to 20. The intention of this is to prevent the nose gear from damage. The top 15 cm may be of lesser strength which would facilitate deceleration of aircraft.

(c) There are also other methods for soil investigation. In case of a deeper sinking than 15 cm, the maximum wheel sinking without collapsing should be examined by using different methods of soil investigation.

CS ADR-DSN.B.191 Drainage characteristics of the movement area and adjacent areas

The safety objective of the drainage systems of the movement area and adjacent areas is to minimise water depth on the surface by draining surface water off the runway in the shortest path practicable and particularly out of the area of the wheel path.

GM1 ADR-DSN.B.191 Drainage characteristics of the movement and adjacent areas

(a) Rapid drainage of surface water is a primary safety consideration in the design, construction and maintenance of movement area and adjacent areas.

(b) The objective is to minimize water depth on the surface by draining water off the runway in the shortest path possible and particularly out of the area of the wheel path There are two distinct drainage processes:

(1) natural drainage of the surface water from the top of the pavement surface until it reaches the final recipient such as rivers or other water bodies; and

(2) dynamic drainage of the surface water trapped under a moving tire until it reaches outside the tire-to-ground contact area.

(c) Both drainage processes can be controlled through design, construction and maintenance of the pavements in order to prevent accumulation of water on the pavement surface.

(d) Surface drainage is a basic requirement and serves to minimise water depth on the surface. Adequate surface drainage is provided primarily by an appropriately sloped surface (in both the longitudinal and transverse directions). The resulting combined longitudinal and transverse slope is the path for the drainage runoff. This path can be shortened by adding transverse grooves.

(e) Dynamic drainage is achieved through built-in texture in the pavement surface. The rolling tire

builds up water pressure and squeezes the water out the escape channels provided by the texture. The dynamic drainage of the tire-to-ground contact area may be improved by adding transverse grooves provided that they are subject to rigorous maintenance.

(f) Through construction, the drainage characteristics of the surface are built into the pavement. These surface characteristics are:

(1) Slopes;

(2) Texture:

(i) Microtexture;

(ii) Macrotexture.

(g) Slopes for the various parts of the movement area and adjacent parts are described in Chapters B to G and figures are given as per cent. Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways, Chapter 5.

(h) Texture in the literature is described as microtexture or macrotexture. These terms are understood differently in various part of the aviation industry.

(i) Microtexture is the texture of the individual stones and is hardly detectable by the eye. Microtexture is considered a primary component in skid resistance at slow speeds. On a wet surface at higher speeds a water film may prevent direct contact between the surface asperities and the tire due to insufficient drainage from the tire-to-ground contact area. Microtexture is a built-in quality of the pavement surface. By specifying crushed material that will withstand polishing microtexture, drainage of thin water films are ensured for a longer period of time. Resistance against polishing is expressed in terms of the polished stone values (PSV) which is in principle a value obtained from a friction measurement in accordance with international standards. These standards define the PSV minima that will enable a material with a good microtexture to be selected. A major problem with microtexture is that it can change within short time periods without being easily detected. A typical example of this is the accumulation of rubber deposits in the touchdown area which will largely mask microtexture without necessarily reducing macrotexture.

(j) Macrotexture is the texture among the individual stones. This scale of texture may be judged approximately by the eye. Macrotexture is primarily created by the size of aggregate used or by

surface treatment of the pavement and is the major factor influencing drainage capacity at high speeds. Materials should be selected so as to achieve good macrotexture.

(k) The primary purpose of grooving a runway surface is to enhance surface drainage. Natural drainage can be slowed down by surface texture, but grooving can speed up the drainage by providing a shorter drainage path and increasing the drainage rate.

(l) For measurement of macrotexture, simple methods such as the 'sand and grease patch' methods described in ICAO Doc 9137, Airport Services Manual, Part 2, Pavement Surface Conditions were developed. These methods were used for the early research on which current airworthiness requirements are based and which refer to a classification categorising macrotexture from A to E. This classification was developed, using sand or grease patch measuring techniques, and issued in 1971 by the Engineering Sciences Data Unit (ESDU).

Runway classification based on texture information from ESDU 71026:	
Classification	Texture depths (mm)
A	0.10 – 0.14
B	0.15 – 0.24
C	0.25 – 0.50
D	0.51 – 1.00
E	1.01 – 2.54

Figure CS-42: Runway classification based on texture information from ESDU 71026

~~(m)~~ Using this classification, the threshold value between microtexture and macrotexture is 0.1 mm mean texture depth (MTD). Related to this scale, the normal wet runway aircraft performance is based upon texture giving drainage and friction qualities midway between classification B and C (0.25 mm). Improved drainage through better texture might qualify for a better aircraft performance class. However, such credit must be in accordance with aeroplane manufacturers' documentation. Presently credit is given to grooved or porous friction course runways following design, construction and maintenance criteria.

(n) For construction, design and maintenance, various international standards are used. Currently ISO 13473-1: 'Characterization of pavement texture by use of surface profiles — Part 1: Determination

of Mean Profile Depth' links the volumetric measuring technique with non- contact profile measuring techniques giving comparable texture values. These standards describe the threshold value between microtexture and macrotexture as 0.5 mm. The volumetric method has a validity range from 0.25 to 5 mm MTD. The profilometry method has a validity range from 0 to 5 mm mean profile depth (MPD). The values of MPD and MTD differ due to the finite size of the glass spheres used in the volumetric technique and because the MPD is derived from a two-dimensional profile rather than a three-dimensional surface. Therefore, a transformation equation must be established for the measuring equipment used to relate MPD to MTD.

(o) The ESDU scale groups runway surfaces based on macrotexture from A through E, where E represents the surface with best dynamic drainage capacity. The ESDU scale thus reflects the dynamic drainage characteristics of the pavement. Grooving any of these surfaces enhances the dynamic drainage capacity. The resulting drainage capacity of the surface is thus a function of the texture (A through E) and grooving. The contribution from grooving is a function of the size of the grooves and the spacing between the grooves. Aerodromes exposed to heavy or torrential rainfall must ensure that the pavement and adjacent areas have drainage capability to withstand these rainfalls or put limitations on the use of the pavements under such extreme situations. These airports should seek to have the maximum allowable slopes and the use of aggregates providing good drainage characteristics. They should also consider grooved pavements in the E classification to ensure that safety is not impaired.

(p) Macrotexture does not change within a short timespan but accumulation of rubber can fill up the texture and as such reduce the drainage capacity, which can result in impaired safety. Furthermore the runway structure may change over time and give unevenness which results in ponding after rainfall. Guidance on rubber removal and unevenness can be found in the Airport Services Manual (Doc 9137), Part 2. Guidance on methods for improving surface texture can be found in the Aerodrome Design Manual (Doc 9157), Part 3.

(q) When groovings are used, the condition of the grooves should be regularly inspected to ensure that no deterioration has occurred and that the grooves are in good condition. Guidance on maintenance of pavements is available in the Airport Services Manual (Doc 9137), Part 2 — Pavement Surface Conditions and Part 9 — Airport Maintenance Practices and the Aerodrome Design Manual (Doc 9157), Part 2.

(r) The pavement may be shot blasted in order to enhance the pavement macrotexture.

CS ADR-DSN.B.195 Clearways

The inclusion of detailed specifications for clearways below is not intended to imply that a clearway has to be provided.

(a) Location of clearways: The origin of a clearway shall be at the end of the take-off run available.

(b) Length of clearways: The length of a clearway shall not exceed half the length of the take-off run available.

(c) Width of clearways:

A clearway shall extend laterally on each side of the extended centre line of the runway, to a distance of at least:

(1) 75 m for instrument runways; and

(2) Half of the width of the runway strip for non-instrument runways.

(d) Slopes on clearways: The ground in a clearway shall not project above a plane having an upward slope of 1.25 %, the lower limit of this plane being a horizontal line which:

(1) is perpendicular to the vertical plane containing the runway centre line; and

(2) passes through a point located on the runway centre line at the end of the take-off run available.

(e) An object situated on a clearway which may endanger aeroplanes in the air shall be regarded as an obstacle and shall be removed.

(f) Abrupt upward changes in slope shall be avoided when the slope on the ground in a clearway is relatively small or when the mean slope is upward. In such situations, in that portion of the clearway within a distance of 22.5 m or half the runway width whichever is greater, on each side of the extended centre line, the slopes, slope changes, and the transition from runway to clearway shall generally conform with those of the runway with which the clearway is associated.

Note 1: Where clearways are provided in conjunction with precision approach runways, Aerodrome Operators should also take cognisance of the physical requirements of a radio altimeter operating area.

GM1 ADR-DSN.B.195 Clearways

(a) Because of transverse or longitudinal slopes on a runway, shoulder, or strip, in certain cases,

the lower limit of the clearway plane specified above may be below the corresponding elevation of the runway, shoulder, or strip. It is not intended that these surfaces be graded to conform with the lower limit of the clearway plane, nor is it intended that terrain or objects which are above the clearway plane beyond the end of the strip, but below the level of the strip be removed unless it is considered that they may endanger aeroplanes.

(b) The decision to provide a stopway and/or a clearway as an alternative to an increased length of runway should depend on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes. The runway, stopway, and clearway lengths to be provided are determined by the aeroplane take-off performance but a check should also be made of the landing distance required by the aeroplanes using the runway to ensure that adequate runway length is provided for landing. The length of a clearway, however, cannot exceed half the length of take-off run available.

(c) The aeroplane performance operating limitations require a length which is enough to ensure that the aeroplane can, after starting a take-off, either be brought safely to a stop or complete the take-off safely. For the purpose of discussion, it is supposed that the runway, stopway and clearway lengths provided at the aerodrome are only just adequate for the aeroplane requiring the longest take-off and accelerate-stop distances, taking into account its take-off mass, runway characteristics, and ambient atmospheric conditions. Under these circumstances there is, for each take-off, a speed, called the decision speed; below this speed, the take-off should be abandoned if an engine fails while above it the take-off should be completed. A very long take-off run and take-off distance would be required to complete a take-off when an engine fails before the decision speed is reached because of the insufficient speed and the reduced power available. There would be no difficulty in stopping in the remaining accelerate-stop distance available provided action is taken immediately. In these circumstances the correct course of action would be to abandon the take-off.

(d) On the other hand if an engine fails after the decision speed is reached, the aeroplane should have sufficient speed and power available to complete the take-off safely in the remaining take- off distance available. However, because of the high speed, there would be difficulty in stopping the aeroplane in the remaining accelerate-stop distance available.

(e) The decision speed is not a fixed speed for any aeroplane but can be selected by the pilot within limits to suit the accelerate-stop and take-off distance available, aeroplane take-off mass,

runway characteristics, and ambient atmospheric conditions at the aerodrome. Normally, a higher decision speed is selected as the accelerate-stop distance available increases.

(f) A variety of combinations of accelerate-stop distances required and take-off distances required can be obtained to accommodate a particular aeroplane, taking into account the aeroplane take-off mass, runway characteristics, and ambient atmospheric conditions. Each combination requires its particular length of take-off run.

(g) The most familiar case is where the decision speed is such that the take-off distance required is equal to the accelerate-stop distance required; this value is known as the balanced field length. Where stopway and clearway are not provided, these distances are both equal to the runway length. However, if landing distance is for the moment ignored, runway is not essential for the whole of the balanced field length, as the take-off run required is, of course, less than the balanced field length. The balanced field length can, therefore, be provided by a runway supplemented by an equal length of clearway and stopway, instead of wholly as a runway. If the runway is used for take-off in both directions, an equal length of clearway and stopway has to be provided at each runway end. The saving in runway length is, therefore, bought at the cost of a greater overall length.

(h) In case economic considerations preclude the provision of stopway and, as a result, only runway and clearway are to be provided, the runway length (neglecting landing requirements) should be equal to the accelerate-stop distance required or the take-off run required whichever is greater. The take-off distance available should be the length of the runway plus the length of clearway.

(i) The minimum runway length and the maximum stopway or clearway length to be provided may be determined as follows, from the data in the aeroplane flight manual for the aeroplane considered to be critical from the viewpoint of runway length requirements:

1) If a stopway is economically possible, the lengths to be provided are those for the balanced field length. The runway length is the take-off run required or the landing distance required whichever is greater. If the accelerate-stop distance required is greater than the runway length so determined, the excess may be provided as stopway, usually at each end of the runway. In addition, a clearway of the same length as the stopway should also be provided;

2) If a stopway is not to be provided, the runway length is the landing distance required, or if it is greater, the accelerate-stop distance required, which corresponds to the lowest practical value of the decision speed. The excess of the take-off distance required over the runway length may be provided as clearway, usually at each end of the runway.

(j) In addition to the above consideration, the concept of clearways in certain circumstances can be applied to a situation where the take-off distance required for all engines operating exceeds that required for the engine failure case.

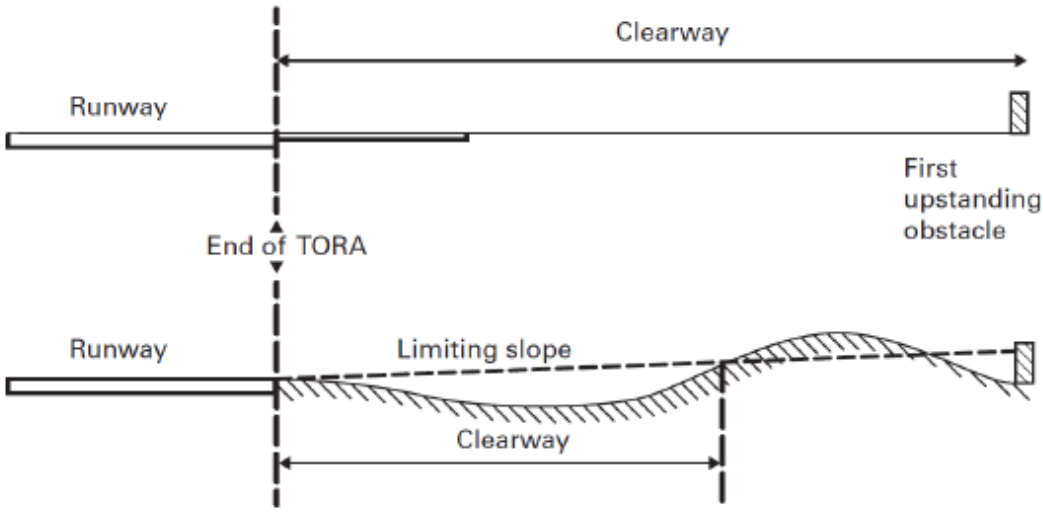


Figure CS-43: Normal Clearways

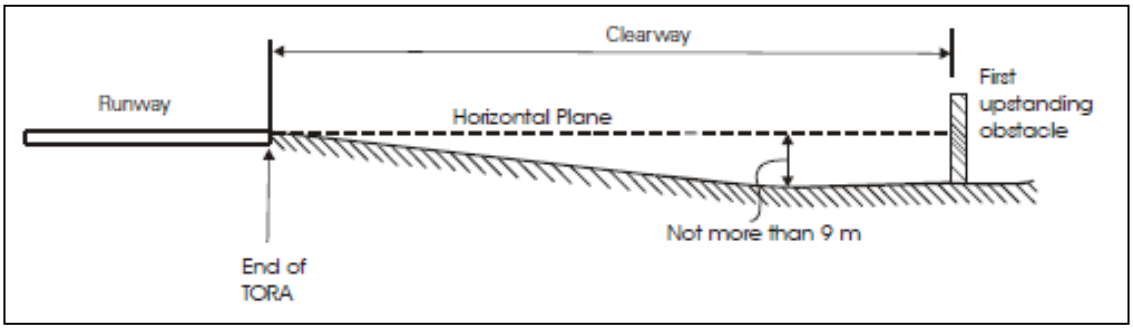


Figure CS-44: Horizontal Plane Clearway not more than 9 m

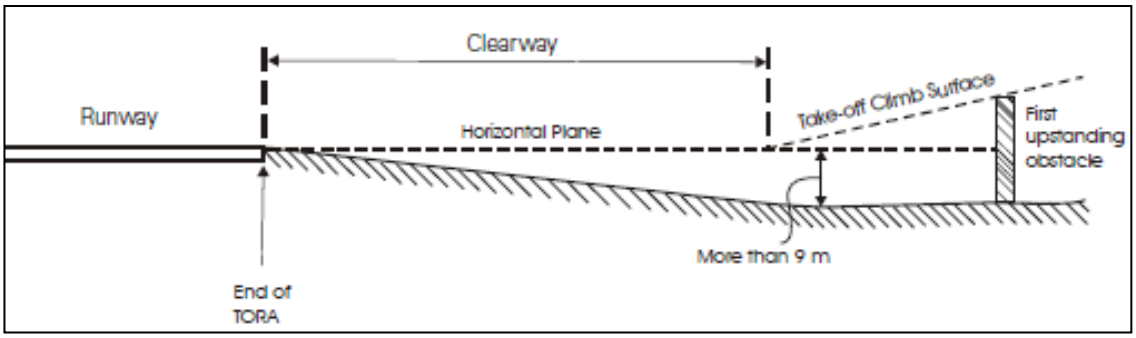


Figure CS-45: Horizontal Plan Clearway more than 9m

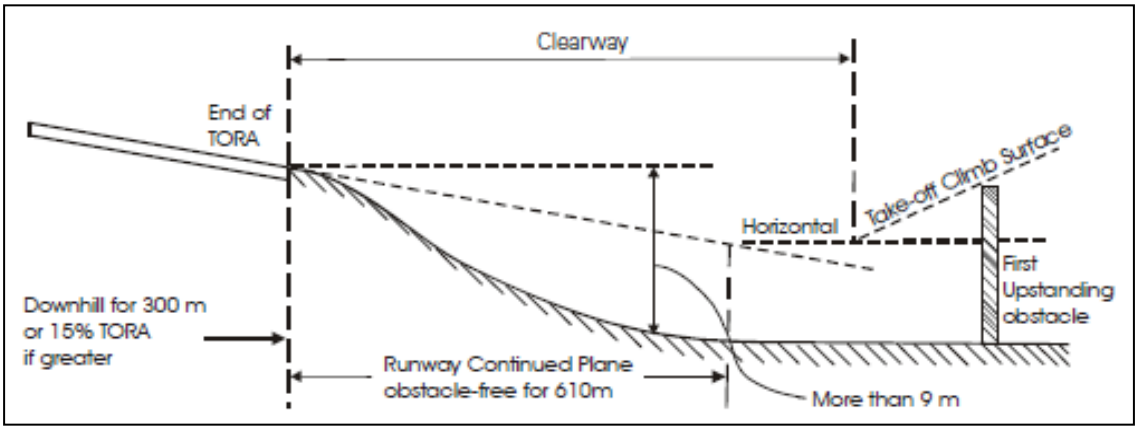


Figure CS-46: Runway Continued Plane Clearway

CS ADR-DSN.B.200 Stopways

The inclusion of detailed specifications for stopways below is not intended to imply that a stopway has to be provided.

(a) Width of stopways: A stopway shall have the same width as the runway with which it is associated.

(b) Slopes on stopways :Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, should comply with the specifications in CS ADR-DSN.B.060 to CS ADR-DSN.B.080 for the runway with which the stopway is associated except that:

(1) the limitation in CS ADR-DSN.B.060(c) of a 0.8 % slope for the first and last quarter of the length of a runway need not be applied to the stopway; and

(2) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be 0.3 % per 30 m (minimum radius of curvature of 10 000 m) for a runway where the code number is 3 or 4.

(c) Strength of stopways: A stopway shall be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

(d) Surface of stopways: The surface of a paved stopway shall be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

GM1 ADR-DSN.B.200 Stopways

(a) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(1) 0.3 % per 30 m (minimum radius of curvature of 10 000 m) where the code number is 3 or 4; and

(2) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

(b) The friction characteristics of an unpaved stopway should not be substantially less than that of the runway with which the stopway is associated.

(c) The economy of a stopway can be entirely lost if, after each usage, it should be regraded and compacted. Therefore, it should be designed to withstand at least a certain number of loadings of the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

(d) Notwithstanding that a stopway may have a paved surface, it is not intended that bearing strength data need to be developed for a stopway.

(e) Where stopways are provided in conjunction with precision approach runways, Aerodrome Operators should also take cognisance of the physical requirements of a radio altimeter operating area.

CS ADR-DSN.B.205 Radio altimeter operating area

(a) A radio altimeter operating area shall be established in the pre-threshold area of a precision approach runway.

(b) Length of the area: A radio altimeter operating area shall extend before the threshold for a distance of at least 300 m.

(c) Width of the area: A radio altimeter operating area should extend laterally, on each side of the

extended centre line of the runway, to a distance of 60 m.

(d) Longitudinal slope changes:

On a radio altimeter operating area, slope changes should be avoided or kept to a minimum. Where slope changes cannot be avoided, the slope changes should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided. The rate of change between two consecutive slopes shall not exceed 2 per cent per 30 m.

GM1 ADR-DSN.B. 205 Radio altimeter operating area

(a) In order to accommodate aeroplanes making auto-coupled approaches and automatic landings (irrespective of weather conditions), it is desirable that slope changes be avoided or kept to a minimum, on a rectangular area at least 300 m long before the threshold of a precision approach runway. The area should be symmetrical about the extended centre line, 120 m wide. When special circumstances so warrant, the width may be reduced to no less than 60 m if a safety assessment indicates that such reduction would not affect the safety of operations of aircraft. This is desirable because these aeroplanes are equipped with a radio altimeter for final height and flare guidance, and when the aeroplane is above the terrain immediately prior to the threshold, the radio altimeter should begin to provide information to the automatic pilot for auto-flare.

(b) With a radio altimeter operating area in the pre-threshold area of a precision approach runway the margin to calculate the decision altitude should be smaller and the usability of the adjacent runway may be enhanced.

(c) Further guidance on radio altimeter operating area is given in ICAO Doc 9365, Manual of All-Weather Operations, Section 5.2.

(d) Guidance on the use of radio altimeter is given in the ICAO, PANS-OPS, Volume II, Part II, Section 1.

CHAPTER C — RUNWAY END SAFETY AREA

CS ADR-DSN.C.210 Runway end safety areas

(a) The safety objective of the Runway End Safety Area (RESA) is to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway.

(b) A Runway End Safety Area shall be provided at each end of a runway strip.

GM1 ADR-DSN.C.210 Runway end safety areas

(a) General

(1) A runway end safety area should provide an area long and wide enough, and suitable to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. On a precision approach runway, the ILS localiser is normally the first upstanding obstacle, and the runway end safety area should extend up to this facility. In other circumstances, the first upstanding obstacle may be a road, a railroad, or other constructed or natural feature. The provisions of a RESA should take such obstacle into consideration.

(2) Whatever length of RESA is provided, it is important to ensure that likelihood of, and potential impacts arising from an overrun are minimised as far as reasonably practicable.

(3) The overrun is a complex risk to assess because there are a number of variables, such as prevailing weather, type of aeroplane, the landing aids available, runway characteristics and available distances, the surrounding environment, and human factors. Each of these can have a significant contribution to the overall hazard; furthermore, the nature of the hazard and level of risk should be different for each aerodrome and even for each runway direction at any one aerodrome. The aerodrome may address some, and these are included below. Additionally, aircraft operating procedures may impact but the aerodrome may have little ability to influence these. This should not prevent aerodromes from working with aircraft operators so that the operations are conducted so as to minimise the likelihood of an overrun occurring.

(4) Noting the requirement for a RESA consideration should be given to providing an area long enough to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. Therefore,

aerodromes should try to maximise the length of RESA available on all applicable runways. When considering the RESA distance required for individual circumstances, aerodromes operators should take into account factors, such as:

(i) the runway length and slope, in particular the general operating lengths required for take-off and landing versus the runway distances available, including the excess of available length over that required;

(ii) current RESA provision (length & width – how much the RESA complies with the recommended distance) and options to increase or improve this;

(iii) the nature and location of any hazard beyond the runway end, including the topography and obstruction environment in and beyond the RESA and outside the runway strip;

(iv) the type of aeroplane and level of traffic at the aerodrome, and actual or proposed changes to either;

(v) aircraft performance limitations arising from runway and RESA length – high performance aircraft, operating at high loads and speeds have greater length requirements than smaller, low-performance aircraft, the relationship between required balanced field length and available distances;

(vi) navigation aids available (PBN, instrument or visual - if an ILS is only available on one runway direction, a downwind approach and landing may be necessary in poor weather) and the availability of vertical guidance ;

(vii) friction and drainage characteristics of the runway, which impact on runway susceptibility to surface contamination and aeroplane braking action;

(viii) traffic density, which may lead to increased pressure to vacate so increased speed;

(ix) aerodrome weather patterns, including wind shear;

(x) aerodrome overrun history; and

(xi) overrun/undershoot causal factors.

(b) Assessment of runway end safety areas

(1) The RESA assessment should help the aerodrome operator identify the hazards and

appropriate actions to reduce the risk. A range of measures may be available, singly or in combination, to reduce the risks of an overrun occurring or becoming an accident. Measures aimed at reducing the likelihood of an overrun/undershoot include:

(i) improving runway surfaces and friction measurement, particularly when the runway is contaminated — know your runways and their condition and characteristics in precipitation;

(ii) ensuring that accurate and up-to-date information on weather, the runway state and characteristics, is notified and passed to flight crews in a timely way, particularly when flight crews need to make operational adjustments;

(iii) improving an aerodrome management's knowledge, recording, prediction and dissemination of wind data, including wind shear, and any other relevant weather information, particularly when it is a significant feature of an aerodrome's weather pattern;

(iv) upgrading visual and instrument landing aids to improve the accuracy of aeroplane delivery at the correct landing position on runways (including the provision of Instrument Landing PBN approach systems, location of aiming point and harmonisation with PAPIs;

(v) formulating, in consultation with aeroplane operators, adverse weather and any other relevant aerodrome operating procedures or restrictions, and promulgating such information appropriately; and

(vi) working with aircraft operators to optimise the operation.

(2) Combined with this, measures may be considered that would reduce the severity of the consequences should an event occur. Wherever practicable, aerodrome operators should seek to optimise the RESA. This may be achieved through a combination of:

(i) relocation, shifting or realignment of the runway — it may be possible to construct additional pavement at the start of take-off end to make more pavement available to retain the declared distances. The start and end of declared distances can be moved towards the downwind (start of take-off) end, thereby retaining the declared distance and creating space for a longer RESA, as shown in GM1 ADR-DSN.B.035;

(ii) in the case where undershoot RESA is limited and the runway has a displaced landing threshold, examine whether the threshold can be moved (downwind) to increase the RESA and/or runway length;

(iii) reducing runway declared distances in order to provide the necessary RESA may be a viable option where the existing runway length exceeds that required for the existing or projected design aircraft. If the take-off distance required for the critical aircraft operating at the aerodrome is less than the take-off distance available, there may be an opportunity to reduce the relevant runway declared distances. Where provision of a runway end safety area would be particularly prohibitive to implement consideration would have to be given to reducing some of the declared distances of the runway for the provision of a runway end safety area and/or installation of an arresting system;

(iv) increasing the length of a RESA, and/or minimising the obstruction environment in the area beyond the RESA. Means to increase the RESA provision include land acquisition, improvements to the grading, realigning fences or roads to provide additional area;

(v) installing an arresting system according to CS ADR-DSN.C.236 (EMAS), or another suitably positioned and designed type of an arresting system, to supplement or as an alternative to a RESA where an equivalent level of safety is demonstrated;

(vi) improving the slopes in the RESA to minimise or remove downward slopes; and

(vii) providing paved RESA with known friction characteristics.

(3) A runway meant for take-off and landing in both directions should have 2 RESAs extending for the required distance beyond the end of the strip extending from the runway end. Depending of the position of the threshold on a runway, the RESA related to the reverse runway should protect aircraft undershooting the threshold. Assessments of overruns and undershoots have shown that the likelihood of an undershoot is approximately four times less than for an overrun. Additionally, the undershoot rate shows that the likelihood of an event is further reduced by the availability of precision approach aids, especially those with vertical guidance. Therefore, on a precision approach runway consideration may include whether to reduce the minimum length of RESA towards the length of the runway

strip before the runway.

(4) It is recognised that improving RESAs is often difficult. However, it is important to note that incremental gains should be obtained wherever possible, as any gain is valuable. Therefore, whenever a runway project involves construction, consideration should also be given to improving the RESA.

(5) The above lists are not in any particular order, are not exhaustive, and should complement action by aeroplane operators, designers and aviation regulators.

(6) RESA provision should be considered by the Local Runway Safety Team.

(c) Arresting systems on Runway End Safety Areas

(1) Arresting systems can be predictable and effective in arresting aeroplane overruns.

(2) Arresting system designs should be supported by a validated design method that can predict the performance of the system. The design method should be derived from field or laboratory tests. Testing may be based either on passage of an actual aircraft or an equivalent single wheel load through a test bed. The design should consider multiple aircraft parameters, including but not limited to allowable aircraft gear loads, gear configuration, tire contact pressure, aircraft centre of gravity, and aircraft speed. The model should calculate imposed aircraft gear loads, g-forces on aircraft occupants, deceleration rates, and stopping distances within the arresting system. Any rebound of the crushed material that may lessen its effectiveness, should also be considered.

(3) Demonstrated performance of an arresting system can be achieved by a validated design method which can predict the performance of the system. The design and performance should be based on the type of aeroplane anticipated to use the associated runway that imposes the greatest demand upon the arresting system.

(4) The design of an arresting system should be based on a critical (or design) aircraft which is defined as aircraft using the associated runway that imposes the greatest demand upon the arresting system. This is usually but not always, the heaviest/largest aircraft that regularly uses the runway. Arresting system performance is dependent not only on aircraft weight but allowable aeroplane gear loads, gear configuration, tire contact pressure, aeroplane centre of gravity and aeroplane speed. Accommodating undershoots should also be addressed. All configurations should be considered in optimising the

arresting system design. The aerodrome operator and arresting system manufacturer should consult regarding the selection of the design aeroplane that should optimise the arresting system for a particular aerodrome. Additionally, the design should allow the safe operation of fully loaded rescue and fire fighting vehicles, including their ingress and egress.

CS ADR-DSN.C.215 Dimension of Runway end safety area

(a) Length of RESA:

A RESA shall extend from the end of a runway strip to a distance of at least.

(1) 240 m where the code number is 3 or 4; and

(2) 120 m where the code number is 1 or 2 and the runway is an instrument one; or

(3) 30 m where the code number is 1 or 2 and the runway is a non-instrument one.

(b) Notwithstanding the provisions in (a) above, the length of the runway end safety area may be reduced where an arresting system is installed, based on the design specifications of the system, subject to acceptance by the GCAA.

(c) Width of runway end safety area: The width of a runway end safety area shall be equal to that of the graded portion of the associated runway strip.

CS ADR-DSN.C.220 Objects on runway end safety areas

Any object situated on a Runway End Safety Area which may endanger aircraft shall be regarded as an obstacle and shall be removed.

CS ADR-DSN.C.225 Clearing and grading of runway end safety areas

A runway end safety area shall provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane undershooting or overrunning the runway.

GM1 ADR-DSN.C.225 Clearing and grading of runway end safety areas

(a) The surface of the runway end safety area should be prepared but does not need to be prepared to the same quality as the runway strip.

(b) Guidance on clearing and grading of runway end safety areas is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

CS ADR-DSN.C.230 Slopes on runway end safety areas

(a) Longitudinal slopes

(1) The slopes of a RESA area shall be such that no part of the RESA penetrates the approach or take-off climb surface.

(2) The longitudinal slopes of a RESA shall not exceed a downward slope of 5 %. Longitudinal slope changes shall be as gradual as practicable, and abrupt changes or sudden reversals of slopes be avoided.

(b) Transverse slopes

The transverse slopes of a runway end safety area shall not exceed an upward or downward slope of 5 %. Transitions between differing slopes shall be as gradual as practicable.

GM1 ADR-DSN.C.230 Slopes on runway end safety areas

Where clearway is provided, the slope on the RESA should be amended accordingly.

CS ADR-DSN.C.235 Strength of runway end safety areas

(a) A runway end safety area shall have a bearing strength sufficient to serve its primary purpose.

(b) A runway end safety area shall be so prepared or constructed as to reduce the risk of damage to an aeroplane undershooting or overrunning the runway, enhance aeroplane deceleration and facilitate the movement of rescue and firefighting vehicles.

GM1 ADR-DSN.C.235 Strength of runway end safety areas

Guidance on the strength of a runway end safety area is given in the Aerodrome Design Manual (Doc 9157), Part 1, Runways.

CS ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)

(a) An EMAS, provided in accordance with paragraph (b) of CS ADR-DSN.C.215, is a type of arresting system consisting of high energy absorbing materials of specific strength, which will reliably and predictably crush under the weight of an aircraft.

(b) Location: An EMAS shall be located beyond the end of the runway or stopway, if provided, at enough setback distance to avoid damage due to jet blast.

(c) General: An EMAS shall:

(1) be supported by a design method that can predict the performance of the system that is validated through laboratory or field tests;

(2) decelerate an aircraft overrunning the runway by exerting predictable forces on the

landing gear without causing major structural damage to the aircraft and avoiding injuries to its occupants;

(3) be a passive system that requires no external means to initiate/trigger its operation to arrest an aircraft;

(4) be constructed not to be damaged by jet blast or projected debris during normal aircraft operations;

(5) use materials which do not generate nor worsen fire hazards to an incoming aircraft. The materials should be non-sparking, non-flammable, not promote combustion, and not emit toxic or malodorous fumes in a fire environment after installation;

(6) be compatible with the installation of approach lighting systems, the radio altimeter operating area and with the meteorological conditions and aerodrome environment;

(7) together with its surroundings, and prevent water accumulation;

(8) have enough mechanical property to avoid damage resulting from personnel walking on it for routine maintenance;

(9) enable the access, movement, and egress of the RFFS vehicles without impeding their activities during an emergency;

(10) be designed for repair to a usable condition (conforming to the original specifications) after an overrun or other type of physical damage, and have an established maintenance programme;

(11) not increase the potential for damage and not cause control capabilities to an aircraft in case of an undershoot more than the risk associated with an undershoot in a RESA;

(12) be frangible and mounted as low as possible with ramps that are provided to avoid vertical surface;

(13) not impede crew and passenger evacuation nor hinder disabled aircraft removal procedures;

(14) not cause visual or electromagnetic interference with any air navigation aids nor have reflecting surfaces that could cause dazzling;

(15) not increase wildlife hazard;

(16) not be considered to meet the definition of a stopway as provided in PART ADR.DEF.

(d) Dimensions:

(1) The functional length of an EMAS shall be designed based on the operating conditions of the associated runway with its centre line coincidental with the extended centre line of the runway.

(2) The functional width of an EMAS shall not be less than the runway width.

(e) Arresting performance:

(1) An EMAS shall be designed to decelerate the design aircraft at an exit speed of 70 knots at both maximum take-off weight (MTOW) and 80 % maximum landing weight (MLW) without imposing loads that exceed the aircraft's design limits, causing major structural damage to the aircraft or imposing excessive forces on its occupants.

(2) When there is insufficient space available for the design on an EMAS in accordance with paragraph (c)(4) above, an EMAS shall be designed to achieve the maximum arresting performance of the critical aeroplane.

(3) The design method for EMAS shall factor in no reverse thrust of the aeroplane, using a 0.25 braking friction coefficient for the runway and length of pavement prior to the arrestor bed (setback).

(4) The design method for the EMAS assumes no braking friction coefficient (0.00) within the EMAS arrestor bed itself, unless the minimum actual braking friction coefficient that can be achieved as an aeroplane passes through the EMAS arrestor bed material can be demonstrated.

(f) Access:

(1) Slopes or steps shall be provided to allow the entrance of the RFFS vehicles from the front and sides and to facilitate crew and passenger evacuation.

(2) On both sides of an EMAS, the requirements for RESA according CS ADR-DSN.C.210 to CS ADR-DSN.C.235 shall be applied.

(3) Service roads shall be set up for maintenance and emergency access. The width of the service roads shall allow access and egress of RFFS vehicles. Service roads shall be graded

to avoid water accumulation. The strength of the service roads pavement shall be capable of supporting the passage of fully loaded RFFS vehicles.

(g) Marking:

An EMAS shall be provided with yellow chevrons in accordance with CS ADR-DSN.R.865 – Pre-threshold area .

GM1 ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)

(a) Engineered materials:

(1) The materials are tailored to specific mechanical properties and are referred to as engineered materials.

(2) The engineered materials have to meet a force-deformation profile within limits which have been shown to assure uniform characteristics, and therefore, predictable response to an aircraft entering the EMAS.

(3) The engineered materials will crush under the landing gears of the aeroplane when it engages the EMAS. The crushing is an irreversible or partly irreversible process and the arresting performance of the system is proportional to the amount of energy that is dissipated.

(b) The compatibility of the EMAS with the specific meteorological and aerodrome conditions is ensured by using materials which:

(1) are water-resistant to the extent that the presence of water does not affect system performance;

(2) do not attract or are physically vulnerable to:

(i) vermin,

(ii) birds,

(iii) wildlife, or

(iv) other creatures

to the greatest extent possible;

(3) do not support unintended plant growth with proper application of herbicides;

(4) exhibit constant strength and density characteristics during all climatic conditions within a temperature range that is appropriate for the local conditions;

(5) are resistant to deterioration as a result of:

(i) salt;

(ii) aircraft and runway de-icing and anti-icing fluids and solids;

(iii) aircraft fuels, hydraulic fluids, and lubricating oils;

(iv) ultraviolet;

(v) water;

(vi) freezing/thawing;

(vii) blowing sand;

(viii) hail;

(viii) paint;

(ix) herbicides.

(c) Undershoot:

(1) An EMAS is not intended to reduce the risk of damage to an aeroplane undershooting the runway. However, the presence of an EMAS cannot increase the potential for damage in case of undershoot more than the risk that is associated with an undershoot in a RESA.

(2) Compliance with CS ADR-DSN.C.236 (c)(11)- EMAS, could be justified through experience of real cases of undershoot in an EMAS, flight simulator tests, other type of studies, or a combination of the three.

(d) An EMAS is a passive system which does not require any specific action or procedures by the flight crew. However, a basic knowledge of the systems by the crew is considered advantageous to prevent undesired evasive manoeuvres that could cause the aircraft to avoid entering the bed or system. The EMAS is designed to be entered preferably straight ahead with the unrestricted use of wheel brakes and/or thrust reversers. Additionally, the availability of an EMAS cannot be used for flight planning purposes, i.e., it cannot be included in the declared distances.

(e) Mechanical property:

(1) An EMAS is not intended to support vehicular traffic for maintenance or normal operating purposes.

(2) The EMAS needs to be capable of supporting personnel walking on it for the purposes of its own maintenance and co-located air navigation aids without causing any damage to its surface.

(f) Setback distance:

(1) The setback distance is defined as the distance between the runway end or stopway, if provided, and the beginning of the EMAS.

(2) The setback distance will vary depending on the available area and the EMAS design.

(3) The calculation of the setback distance balances the risk objectives of:

(i) providing enough area for arresting purposes;

(ii) providing enough separation to protect the bed from jet blast;

(iii) providing separation from the threshold to reduce the probability of undershoot in the EMAS; and

(iv) decreasing the probability of aircraft overruns passing by one side of the EMAS due to lateral dispersion.

The safety assessment determines the relevance of each risk objective, taking into account the operating particularities of the associated runway, including usage of the runway, types of approach, weather conditions, fleet, incidents and accidents, and any other particularity related with runway safety.

(4) To reduce the probability of an aircraft undershooting in an EMAS, it is recommended to provide a minimum setback distance of at least 60 m from the threshold or runway end. However, this separation may be reduced if a safety assessment determines that it is the best alternative for both overrun and undershoot protection.

(g) An EMAS normally includes steps and/or slopes at its end and both sides, but they are not considered functional for arresting purposes. Where possible, the functional width of the EMAS is to be maintained the same throughout the whole length of the system.

(h) Exit speed is defined as the speed of the nose gear of the aeroplane as it passes the runway end or stopway, if provided.

(i) The critical aircraft is defined as the aircraft that regularly uses the associated runway that imposes the greatest demand upon the EMAS.

(j) Design aircraft list refers to the combination of aircraft types which are/will be operating regularly on the runway.

The critical aircraft is usually, but not always, the heaviest/largest aircraft that regularly uses the runway. The performance of an EMAS is dependent not only on aeroplane weight, but also on the landing gear configuration, tyre pressure, and centre of gravity. In general, the operational maximum take-off weight (operational MTOW) is used for the critical aircraft. However, there may be instances where less than the MTOW will require a longer EMAS. All parameters are to be considered in optimising the EMAS design. However, to the extent practicable, the EMAS design may consider both the aeroplane that imposes the greatest demand upon the EMAS and the range of aircraft expected to operate regularly on the runway. In some instances, a composite of design aircraft may be preferable to optimising the EMAS for a specific runway than a single critical aircraft. Other factors that are unique to a particular aerodrome, such as available RESA and air cargo operations, should also be considered in the final design.

(k) Testing:

Testing is to be based either on passage of an actual aircraft, or a single wheel bearing an equivalent load through a test bed. The design will need to consider multiple aircraft parameters, including but not limited to allowable aircraft gear loads, gear configuration, tyre contact pressure, weight, centre of gravity, and speed.

(l) The information relating to the provision of a runway end safety area and the presence of an arresting system should be published in the AIP and information/instructions promulgated to local runway safety teams and others to promote awareness in the pilot community.

CHAPTER D — TAXIWAYS

CS ADR-DSN.D.240 Taxiways- general

Unless otherwise indicated, the requirements in Chapter D - Taxiways are applicable to all types of taxiways.

(a) Taxiways shall be provided to permit the safe and expeditious surface movement of aircraft.

(b) Sufficient entrance and exit taxiways for a runway shall be provided to expedite the movement of aircraft to and from the runway and provision of rapid exit taxiways considered when traffic volumes are high.

(c) The design of a taxiway shall be such that, when the cockpit of the aeroplane for which the taxiway is intended, remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway shall be not less than that given by the following table:

	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Clearance	1.50 m	2.25 m	3 m [a, b] or 4 m [c]	4 m
[a] on straight portions. [b] on curved portions if the taxiway is intended to be used by aeroplanes with a wheel base of less than 18 m. [c] on curved portions if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.				
Wheel base means the distance from the nose gear to the geometric centre of the main gear.				

Table CS-39: OMGWS Clearance - Taxiways

GM1 ADR-DSN.D.240 Taxiways- general

(a) Design of runway and taxiway infrastructure that either prevents aircraft entering or crossing a runway or mitigates the risk of an aircraft runway incursion collision should be considered both in the development of any new infrastructure and as a retrospective enhancement to existing infrastructure especially in hot-spot areas (areas where risk appraisal or incident data demonstrates a higher risk). This guidance may be considered as part of a runway incursion prevention programme and to help ensure that runway incursion aspects are addressed in any

new design proposal.

(b) The initial approach should be to reduce the number of available entrances to the runway, so that the potential for entry to the runway at an unintended location is minimised. Taxiway entry, crossing and runway exit taxiways should be clearly identified and promulgated, using taxiing guidance signs, lighting and pavement markings.

(c) Many aerodromes have more than one runway, notably paired parallel runways (two runways on one side of the terminal apron), which create a difficult problem in that either on arrival or departure an aircraft is required to cross a runway. The potential for runway crossings should be eliminated or at least be as low as reasonably practicable. This may be achieved by constructing a 'perimeter taxiway' to enable aircraft to get to the departure runway or to the apron without either crossing a runway, or conflicting with an approaching or departing aircraft.

(d) A perimeter taxiway is ideally designed according to the following criteria:

(1) Sufficient space is required between the landing threshold and the taxiway centre line where it crosses under the approach path, to enable the critical aeroplane to pass under the approach without violating the approach surface;

(2) The extent of the jet blast impact of aircraft taking off is considered when determining the location of a perimeter taxiway;

(3) The requirement for RESA, as well as possible interference with the ILS or other navigation aids is also considered: the perimeter taxiway is located behind the localiser antenna, not between the localiser antenna and the runway, due to the potential for severe ILS disturbance, noting that this is harder to achieve as the distance between the localiser and the runway increases. Likewise, perimeter roads are provided where possible;

(4) Appropriate measures should be considered in order to assist pilots to distinguish between aircraft that are crossing the runway and those that are safely on a perimeter taxiway.

(e) Taxiways crossing runways should be provided at low energy locations, preferably at the runway ends. Where runway crossings cannot be eliminated, they should only be done on taxiways at right angles to a runway. This will afford the flight crew an unobstructed view of the runway, in both directions, to confirm that the runway and approach is clear of conflicting traffic before proceeding across.

(f) The runway/taxiway junction configuration should be simple, for example with single taxiway entrances; this is particularly relevant for taxiways crossing runways.

(g) The main design principles for entry and exit taxiways are:

(1) Taxiways should be perpendicular to the runway centre line if possible;

(2) The taxiway angle should be such that the crew of an aircraft at a taxiway holding position (if any) should be able to see an aircraft using or approaching the runway. Where the taxiway angle is such that this clear view, in both directions is not possible, consideration is given to provide a perpendicular portion of the taxiway immediately adjacent to the runway to allow for a full visual scan prior to entering (or crossing);

(3) Rapid exit taxiways are designed to be runway exits. Whilst it may be an operational practice at some airports to allow smaller aircraft the option of departing at a mid-point on the runway from one of these rapid exit taxiways, the geometry of the taxiway/runway intersection does not allow the crew to properly scan the runway in both directions to confirm that there is no conflicting traffic. This practice should thus be eliminated and from the design point of view, all signage and markings should deter any aircraft from using these rapid exit taxiways for any purpose other than what they are designed for (exiting the runway after landing). However, this may be mitigated by the addition of a fillet so that aircraft can manoeuvre to see down the approach. Note that aircraft on an angled taxiway may have a greater likelihood of causing ILS interference;

(4) A clear separation of pavement between a rapid exit taxiway and other non-rapid taxiways entering or crossing a runway should be provided. This design principle prevents two taxiways from overlapping with each other and creating an excessive paved area that would confuse pilots entering a runway;

(5) Limiting the options available to pilots on each entrance or exit helps to avoid confusion. Therefore, avoid dual or multiple taxiway entrances at one location, as Y-shaped connectors present opportunities for runway incursions and for aircraft vacating the runway to enter the wrong taxiway. Limiting the options available to pilots on each entrance or exit helps to avoid confusion;

(6) Runway/taxiway separations should be sufficient to permit space for effective RETs;

(7) Avoid designs which include crossing a runway to access a taxiway;

(8) Provide clear separation between high speed (RET) and taxi speed runway exits; if RETs are provided have a series in a row without other entrances;

(9) Where the aerodrome has more than one runway, ensure that runway ends are not too close together; if this is not possible ensure that they are clearly identified as separated. This may be achieved through visual aids, taxiway design and the taxiway naming convention;

(10) Surface colour should not create confusion:

(i) Have different colours for runway and taxiways;

(ii) Avoid a mix of concrete & asphalt.

(11) Wide taxiway entrances onto runways should be broken up with islands or barriers or painting taxiway edges with continuous edge markings to indicate unusable pavement. Avoid long holding position lines and excess paved areas which reduce the effectiveness of signs and markings. Use standard taxiway widths, suitable for a wide range of aeroplane, including the largest type expected to use the aerodrome;

(12) Avoid multi-taxiway intersections and reduce the number of taxiways at any intersection as far as possible;

(13) As far as practicable, it is preferable to redesign rather than reconfigure or repaint where possible – design errors out and reduce potential for human error;

(14) Consistent design of runway entrances – same visual aids at each, both taxiways and service road accesses;

(15) It is always preferable for safety reasons to have a taxiway parallel to the runway all along the runway, even if capacity constraints do not make it necessary.

(h) Aerodrome infrastructure can also be used to support design, whether by the systems installed or by their operating characteristics. Examples include:

(1) Stopbars and runway guard lights should be provided at all entrances, and preferably illuminated H24 and in all weather conditions. Runway incursions do not happen only under restricted visibilities. In fact, more incursions happen when the weather is good;

(2) Avoid confusion between CAT I and CAT III holding positions. This may be achieved in

some circumstances by combining both holding positions;

(i) Multi-taxiway entrances to a runway should be parallel to each other and should be distinctly separated by an unpaved area. This design principle allows each runway holding location an earthen area for the proper placement of accompanying sign, marking, and lighting visual cues at each runway holding position. Moreover, the design principle eliminates the construction of unusable pavement and as well as the painting of taxiway edge markings to indicate such unusable pavement. In general, excess paved areas at runway holding positions reduce the effectiveness of sign, marking, and lighting visual cues.

(j) CS ADR-DSN.N.785- Information Signs, provides for a standardised scheme for the nomenclature of taxiways to improve situational awareness and as a part of an effective runway incursion prevention measure.

(k) Additional guidance on layout and standardised nomenclature of taxiways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.245 Width of taxiways

A straight portion of a taxiway should have a width of not less than that given by the following table:

	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Taxiway width	7.5 m	10.5 m	15 m	23 m

Table CS-40: Width of the Taxiways

GM1 ADR-DSN.D.245 Width of taxiways

(a) The width of the taxiway should be measured at the edge of the paved surface, or where the taxiway edge is marked, at the outside edge of the taxiway edge marking.

(b) Additional guidance on width of taxiways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.250 Taxiway curves

(a) Changes in direction of taxiways should be as few and small as possible. The radii of the curves shall be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended.

(b) The design of the curve shall be such that when the cockpit of the aircraft for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aircraft and the edge of the taxiway shall be not less than those specified in CS ADR-DSN.D.240 – Taxiways General.

GM1 ADR-DSN.D.250 Taxiway curves

(a) The location of taxiway centre line markings and lights are specified in CS ADR-DSN.L.555 and CS ADR-DSN.M.710.

(b) Compound curves may reduce or eliminate the need for extra taxiway width.

(c) An example of widening taxiways to achieve the wheel clearance specified is illustrated in Figure CS-46. Guidance on the values of suitable dimensions is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

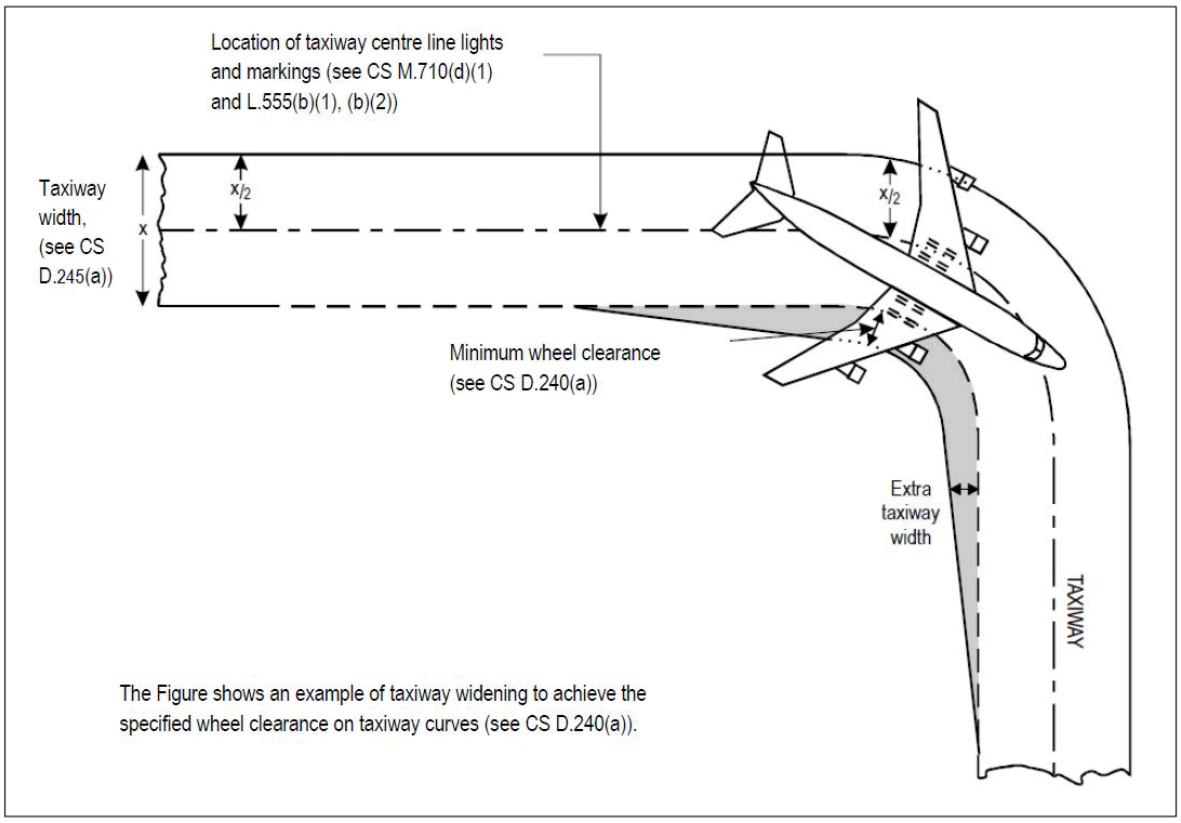


Figure CS-47: Taxiway Curve

CS ADR-DSN.D.255 Junction and intersection of taxiways

(a) To facilitate the movement of aeroplanes, fillets shall be provided at junctions and intersections

of taxiways with runways, aprons, and other taxiways.

(b) The design of the fillets shall ensure that the minimum wheel clearances specified in CS ADR-DSN.D.240-Taxiways- general are maintained when aeroplanes are manoeuvring through the junctions or intersections.

GM1 ADR-DSN.D.255 Junction and intersection of taxiways

Consideration should be given to the aeroplane datum length when designing fillets. Guidance on the design of fillets and the definition of the term aeroplane datum length are given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.260 Taxiway minimum separation distance

(a) The safety objective of minimum taxi separation distances is to allow safe use of taxiways and aircraft stand taxilanes to prevent possible collision with other aeroplanes operating on adjacent runways or taxiways, or collision with adjacent objects.

(b) The separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway or an object should not be less than the appropriate dimension specified in Table CS-37.

	Distance between taxiway centre line and runway centre line								Taxiway centre line to taxiway centre line (m)	Taxiway, other than aircraft stand taxilane, centre line to object (m)	Aircraft stand taxilane centre line to aircraft stand taxilane centre line (m)	Aircraft stand taxilane centre line to object (m)
	Instrument Runways Code Number				Non-Instrument Runways Code Number							
Code Letter	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A	77.5	77.5	-	-	37.5	47.5	-	-	23	15.5	19.5	12
B	82	82	-	-	42	52	87	-	32	20	28.5	16.5
C	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	-	-	166	166	-	-	101	101	63	37	59.5	33.5
E	-	-	172.5	172.5	-	-	107.5	107.5	76	43.5	72.5	40
F	-	-	180	180	-	-	115	115	91	51	87.5	47.5

Table CS-41: Taxiway minimum separation distances

Note 1.— The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 2.— The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the Aerodrome Design Manual (Doc 9157), Part 2.

Note 3 — The separation distances, as prescribed in Table CS-37, may have to be increased on taxiway curves to accommodate the wing sweep of the critical aeroplane or on dual parallel taxiways when, as for example, used as bypass taxiways.

GM1 ADR-DSN.D.260 Taxiway minimum separation distance

(a) Guidance on factors which may be considered in the safety assessment is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

(b) ILS and MLS installations may also influence the location of taxiways due to interferences to ILS and MLS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS and MLS installations is contained in ICAO, Annex 10, Volume I, Attachments C and G (respectively).

(c) The separation distances, as prescribed in Table CS-37, column (10), do not necessarily provide the capability of making a normal turn from one taxiway to another parallel taxiway. Guidance for this condition is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

(d) The separation distance between the centre line of an aircraft stand taxilane and an object, as prescribed in Table CS-37, column (13), may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

(e) It may be permissible to operate with lower separation distances at an existing aerodrome if a safety assessment indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) The separation distances, as prescribed in Table CS-37, may have to be increased on taxiway curves to accommodate the wing sweep of the critical aeroplane or on dual parallel taxiways when, as for example, used as bypass taxiways.

(g) The requirements for apron taxiways regarding strip width, separation distances, etc., are the same as for any other type of taxiway.

CS ADR-DSN.D.265 Longitudinal slopes on taxiways

(a) The safety objective of limiting the longitudinal taxiway slope is to enable stabilised safe use of taxiway by an aircraft.

(b) The longitudinal slope of a taxiway should not exceed:

(1) 1.5 % where the code letter is C, D, E, or F; and

(2) 3 % where the code letter is A or B.

CS ADR-DSN.D.270 Longitudinal slope changes on taxiways

(a) The safety objective of limiting the longitudinal taxiway slope changes is to avoid damage of aircraft and to enable safe use of taxiway by an aircraft.

(b) Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface with a rate of change not exceeding:

(1) 1 % per 30 m (minimum radius of curvature of 3,000 m) where the code letter is C, D, E, or F; and

(2) 1 % per 25 m (minimum radius of curvature of 2,500 m) where the code letter is A or B.

CS ADR-DSN.D.275 Sight distance of taxiways

(a) The safety objective of minimum taxiway sight distance values is to achieve the necessary visibility to enable safe use of taxiway by an aircraft.

(b) Where a change in slope on a taxiway cannot be avoided, the change shall be such that, from any point:

(1) 3 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 300 m from that point where the code letter is C, D, E, or F;

(2) 2 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 200 m from that point where the code letter is B; and

(3) 1.5 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 150 m from that point where the code letter is A.

CS ADR-DSN.D.280 Transverse slopes on taxiways

(a) The safety objective of taxiway transverse slopes is to promote the most rapid drainage of water from the taxiway.

(b) The transverse slopes of a taxiway shall be sufficient to prevent the accumulation of water on the surface of the taxiway but shall not exceed:

(1) 1.5 % where the code letter is C, D, E, or F; and

(2) 2 % where the code letter is A or B.

GM1 ADR-DSN.D.280 Transverse slopes on taxiways

The slopes on a taxiway are intended to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). Slopes should be so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft.

CS ADR-DSN.D.285 Strength of taxiways

The strength of a taxiway shall be suitable for the aircraft that the taxiway is intended to serve and should be at least equal to that of the runway it serves.

GM1 ADR-DSN.D.285 Strength of taxiways

(a) Due consideration is to be given to the fact that a taxiway is subjected to a greater density of traffic and as a result of slow moving and stationary aeroplanes, to higher stresses than the runway it serves.

(b) Additional information on the bearing strength, the design, and evaluation of pavements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

CS ADR-DSN.D.290 Surface of taxiways

(a) The surface of a taxiway shall not have irregularities that cause damage to aircraft structures.

(b) The surface of a paved taxiway shall be so constructed or resurfaced as to provide suitable surface friction characteristics.

GM1 ADR-DSN.D.290 Surface of taxiways

Suitable surface friction characteristics are required on taxiways that assure safe operation of aeroplanes.

CS ADR-DSN.D.295 Rapid exit taxiways

(a) The safety objective of rapid exit taxiway is to facilitate safe rapid exit of aeroplanes from a runway.

(b) A rapid exit taxiway shall be designed with a radius of turn-off curve of at least:

(1) 550 m where the code number is 3 or 4; and

(2) 275 m where the code number is 1 or 2;

(c) to enable under wet conditions, exit speeds of:

(1) 93 km/h where the code number is 3 or 4; and

(2) 65 km/h where the code number is 1 or 2.

(d) The radius of the fillet on the inside of the curve at a rapid exit taxiway shall be sufficient to provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off onto the taxiway.

(e) A rapid exit taxiway shall include a straight distance after the turn-off curve sufficient for an exiting aircraft to come to a full stop clear of any intersecting taxiway (Figure CS-47).

(f) The intersection angle of a rapid exit taxiway with the runway shall not be greater than 45°, nor less than 25° and preferably should be 30°.

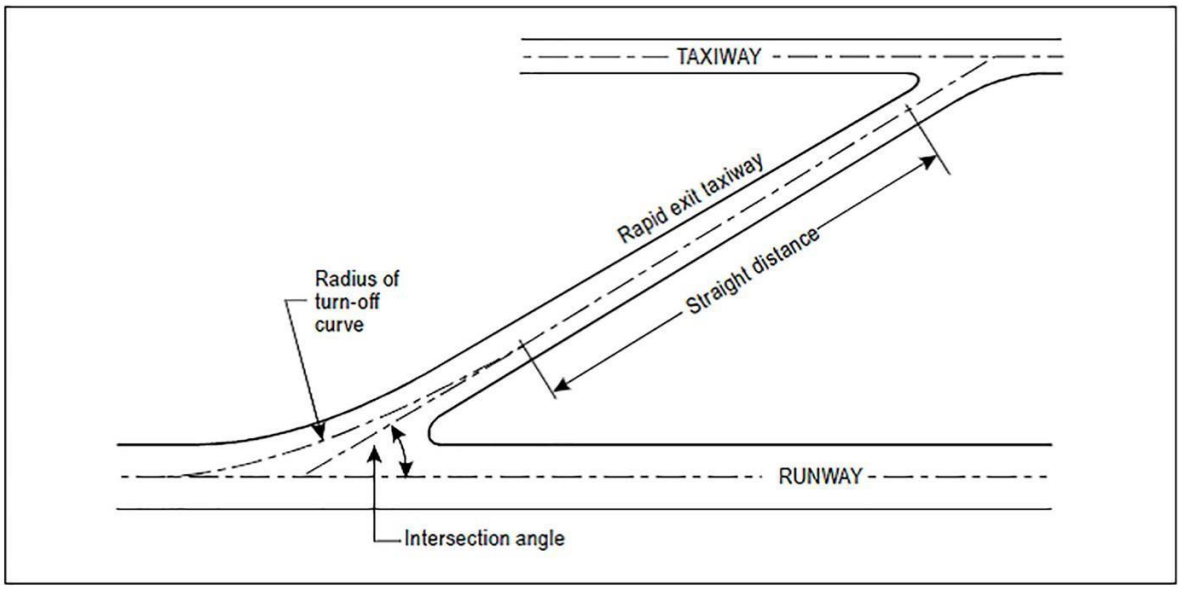


Figure CS-48: Rapid exit taxiway

GM1 ADR-DSN.D.295 Rapid exit taxiways

(a) The guidance applies particularly to rapid exit taxiways (see Figure CS-47). The general requirements for taxiways, as prescribed in the relevant certification specifications, are also applicable to rapid exit taxiways. Guidance on the provision, location and design of rapid exit taxiways is included in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays;

(b) The locations of rapid exit taxiways along a runway are based on several criteria described in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays, in addition to different speed criteria.

CS ADR-DSN.D.300 Taxiway on bridges

(a) The width of that portion of a taxiway bridge capable of supporting aeroplanes, as measured perpendicularly to the taxiway centre line, shall not be less than the width of the graded area of the strip provided for that taxiway unless a proven method of lateral restraint is provided which shall not be hazardous for aeroplanes for which the taxiway is intended.

(b) Access shall be provided to allow rescue and firefighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended.

(c) A bridge shall be constructed on a straight section of the taxiway with a straight section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

GM1 ADR-DSN.D.300 Taxiway on bridges

If aeroplane engines overhang the bridge structure, protection of adjacent areas below the bridge from engine blast may be required.

CS ADR-DSN.D.305 Taxiway shoulders

(a) Straight portions of a taxiway where the code letter is C, D, E, or F shall be provided with shoulders which extend symmetrically on each side of the taxiway so that the overall width of the taxiway and its shoulders on straight portions is not less than:

(1) 44 m where the code letter is F;

(2) 38 m where the code letter is E;

(3) 34 m where the code letter is D; and

(4) 25 m where the code letter is C.

(b) On taxiway curves and on junctions or intersections where increased pavement is provided, the shoulder width shall be not less than that on the adjacent straight portions of the taxiway.

(c) When a taxiway is intended to be used by turbine-engined aeroplanes, the surface of the taxiway shoulder shall be prepared so as to resist erosion and the ingestion of the surface material by aeroplane engines.

(d) If the taxiway is intended to serve code F aircraft or an aircraft with engines that overhang the shoulders, the inner most 3 m shall be sealed.

GM1 ADR-DSN.D.305 Taxiway shoulders

Guidance on characteristics of taxiway shoulders and on shoulder treatment is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.310 Taxiway strips

A taxiway, other than an aircraft stand taxilane, shall be included in a strip.

GM1 ADR-DSN.D.310 Taxiway strips

(a) A taxiway strip should be so prepared or constructed as to minimise hazards arising from differences in load bearing capacity to aeroplanes which the taxiway is intended to serve in the event of an aeroplane accidentally running off the taxiway.

(b) Guidance on characteristics of taxiway strips is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.315 Width of taxiway strips

(a) The safety objective of the width of taxiway strips is to allow safe use of taxiways in relation to adjacent objects.

(b) A taxiway strip shall extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to at least the distance from the centre line given in Table CS-37, column (11).

CS ADR-DSN.D.320 Objects on taxiway strips

The taxiway strip shall provide an area clear of objects which may endanger taxiing aeroplanes.

GM1 ADR-DSN.D.320 Objects on taxiway strips

(a) Consideration should be given to the location and design of drains on a taxiway strip to prevent damage to an aeroplane accidentally running off a taxiway. Suitably designed drain covers may be required.

(b) The detailed requirements for siting objects on taxiway strips are in CS ADR-DSN.T.915 – Siting of equipment and installations on operational area.

(c) Where open-air or covered storm water conveyances are installed, consideration should be given in order to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

(d) Particular attention needs to be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, in particular birds. The open-air storm water conveyance may be covered by a net, if required. Further guidance is given in ICAO Doc 9137, Airport Services Manual, Part 3, Wildlife Control and Reduction.

(e) Guidance on the design of drain covers is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.325 Grading of taxiway strips

(a) The safety objective of the grading of a taxiway strip is to reduce the risk of damage to an aircraft accidentally running off the taxiway.

(b) The centre portion of a taxiway strip shall provide a graded area to a distance from the centre line

of the taxiway of at least:

(1) 10.25 m where the OMGWS is up to but not including 4.5 m;

(2) 11 m where the OMGWS is 4.5 m up to but not including 6 m;

(3) 12.50 m where the OMGWS is 6 m up to but not including 9 m;

(4) 18.50 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is D;

(5) 19 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is E;

(6) 22 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is F.

GM1 ADR-DSN.D.325 Grading of taxiway strips

Further guidance on the width of the graded portion of a taxiway is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.D.330 Slopes on taxiway strips

(a) The safety objective of limiting the longitudinal taxiway strip slopes and slope changes and of minimum sight distances values is to reduce the probability of damage to an aircraft accidentally running off the taxiway and to enable safe use of these areas by rescue and firefighting vehicles.

(b) The surface of the strip shall be flush at the edge of the taxiway or shoulder if provided, and the graded portion shall not have an upward transverse slope exceeding:

1) 2.5 % for strips where the code letter is C, D, E, or F; and

2) 3 % for strips of taxiways where the code letter is A or B;

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope shall not exceed 5 % measured with reference to the horizontal.

(c) The transverse slopes on any portion of a taxiway strip beyond that to be graded should not exceed an upward or downward slope of 5 % as measured in the direction away from the taxiway.

GM1 ADR-DSN.D.330 Slopes on taxiway strips

(a) Where required for proper drainage, an open-air storm water conveyance may be allowed in the non-graded portion of a taxiway strip and should be placed as far as practicable from the

taxiway.

(b) The locations of open-air storm water conveyances within the non-graded portion of a taxiway strip should be so designed to permit unobstructed access for rescue and firefighting services (RFFS).

CS ADR-DSN.D.355 Holding bays, runway-holding positions, intermediate holding positions, and road-holding positions.

(a) Holding bay(s) or other bypasses of sufficient size and adequate construction should be provided where the traffic density is medium or heavy or where necessary, to make deviations in the departure sequence possible.

(b) A runway-holding position or positions shall be established:

(1) on the taxiway, if the location or alignment of the taxiway is such that a taxiing aircraft or vehicle can infringe an obstacle limitation surface or ILS/MLS critical/sensitive area or interfere with the operation of radio navigation aids;

(2) on the taxiway, at the intersection of a taxiway and a runway; and

(3) at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

(c) An intermediate holding position should be established on a taxiway at any point other than a runway-holding position where it is desirable to define a specific holding limit.

(d) An emergency access road shall be equipped with road-holding positions at all intersections with runways and taxiways.

(e) A road-holding position shall be established at each intersection of a road with a runway.

GM1 ADR-DSN.D.335 Holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

(a) Holding bay(s) should be provided when the traffic density is medium or heavy.

(b) At low levels of aerodrome activity (less than approximately 50 000 annual operations), there is normally little need to make deviations in the departure sequence. However, for higher activity levels, aerodromes with single taxiways and no holding bays or other bypasses provide aerodrome control units with no opportunity to change the sequence of departures once the aircraft have left the apron. In particular, at aerodromes with large apron areas, it is often

difficult to arrange for aircraft to leave the apron in such a way that they should arrive at the end of the runway in the sequence required by air traffic services units.

(c) The provision of an adequate number of holding bay spaces or other bypasses, based upon an analysis of the current and near-term hourly aircraft departure demand, should allow a large degree of flexibility in generating the departure sequence.

(d) The space required for a holding bay depends on the number of aircraft positions to be provided, the size of the aircraft to be accommodated, and the frequency of their utilisation. The dimensions should allow for sufficient space between aircraft to enable them to manoeuvre independently.

(e) Emergency access roads are not intended for use for the functions of aerodrome service roads. However, they should be provided by different access controls which should be clearly visible for all service ground traffic.

(f) Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays and ICAO Doc 4444, Procedures for Air Navigation Services — Air Traffic Management.

CS ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

(a) The distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway shall be in accordance with Table CS-38 and such that a holding aircraft or vehicle should not interfere with the operation of radio navigation aids or penetrate the inner transitional surface.

(b) At elevations greater than 700 m the distance of 90 m specified in Table CS-38 for a precision approach runway code number 4 should be increased as follows:

(1) up to an elevation of 2 000 m; 1 m for every 100 m in excess of 700 m;

(2) elevation in excess of 2 000 m and up to 4 000 m; 13 m plus 1.5 m for every 100 m in excess of 2 000 m; and

(3) elevation in excess of 4 000 m and up to 5 000 m; 43 m plus 2 m for every 100 m in excess of 4 000 m.

(c) If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance specified in Table CS-38 should be further increased 5 m for every meter the bay or position is higher than the threshold.

(d) The location of a runway-holding position established in accordance with CS ADR-DSN.D.335 shall be such that a holding aircraft or vehicle will not infringe the obstacle-free zone, approach surface, take-off climb surface or ILS/MLS critical/sensitive area or interfere with the operation of radio navigation aids.

Type of runway	Code number			
	1	2	3	4
Non-instrument	30 m	40 m	75 m	75 m
Non-precision approach	40 m	40 m	75 m	75 m
Precision approach Category I	60 m[b]	60 m[b]	90 m[a,b]	90 m[a,b,c]
Precision approach Categories II and III	—	—	90 m[a,b]	90 m[a,b,c]
Take-off runway	30 m	40 m	75 m	75 m
a. If a holding bay, runway-holding position, or road-holding position is at a lower elevation compared to the threshold, the distance may be decreased 5 m for every meter the bay or holding position is lower than the threshold, contingent upon not infringing the inner transitional surface.				
b. This distance may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localiser facilities.				
c. Where the code letter is F, this distance should be at least 100 m.				

Note 1: The distance of 90 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 52.7 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle-free zone and not accountable for the calculation of OCA/H.

Note 2: The distance of 60 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.6 m and a nose height of 5.2 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle-free zone.

Note: For code number 4 where the width of the inner edge of the inner approach surface is more than 120m, a distance greater than 90m may be necessary to ensure that a holding aircraft is clear of the obstacle free zone. For example, a distance of 100 m is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the Obstacle Free Zone.

Elevation of taxiway should be taken into account for possible increase of the distances indicated in this table.

Table CS-42 : Minimum distance from the runway centre line to a holding bay, runway-holding position, or road holding position

GM1 ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

(a) Care should be taken so that propeller wash and jet blast from holding aircraft do not interfere with aircraft operations, cause damage to vehicles, or injure people.

(b) Generally, when used to allow flexible departure sequencing, the most advantageous location for a holding bay is adjacent to the taxiway serving the runway end. Other locations along the taxiway are satisfactory for aircraft performing pre-flight checks or engine run-ups, or as a holding point for aircraft awaiting departure clearance.

(c) An aircraft taxiing could endanger aircraft operations when the aircraft is too close to the runway during take-off and landings. It is so advised to check if the aircraft taking off or landing could be hinder. For this OLS and specially approach surfaces, take-off climb surfaces and OFZ

are the first aspects to consider. An aircraft taxiing could also endanger aircraft operations when the aircraft location and orientation are so that the aircraft interfere with navigation aids. It is specific to instrument runways and especially important for precision approach runways. The non-penetration of critical/sensitive areas is the first check. The areas within which this degradable interference of course or path signals are possible need to be defined and recognised. For the purposes of developing protective zoning criteria for ILS, these areas are critical areas and sensitive areas. The ILS critical area is an area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations. The critical area is protected, since the presence of vehicles and/or aircraft inside the critical area boundaries would cause unacceptable disturbance to the ILS signal. The ILS

sensitive area is an area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations.

(d) For all runways, it should be verified that the distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway is so that a holding aircraft or vehicle should not infringe the approach surface and/or take-off climb surface.

(e) If the affected runway is used under precision approach procedures, it should be also verified that the distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway is so that a holding aircraft or vehicle should not infringe the obstacle-free zone and the critical/sensitive areas of precision approach navigation aids (e.g. ILS/MLS).

(f) If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance specified in Table CS-38 could be further increased 5 m for every metres the bay or position is higher than the threshold.

(g) An aircraft taxiing could also endanger aircraft operation when the aircraft is too close to other taxiing aircraft. For this, separation distances or margins between taxiing aircraft or taxiways should be considered.

(h) In radiotelephony phraseologies, the expression ‘holding point’ is used to designate the runway-

holding position.

(i) Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CHAPTER E — APRONS

CS ADR-DSN.E.345 General

Aprons shall be provided where necessary to permit the safe loading and off-loading of passengers, cargo, or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

CS ADR-DSN.E.350 Size of aprons

The total apron area shall be adequate to permit safe and expeditious handling of aerodrome traffic at its maximum anticipated density.

GM1 ADR-DSN.E.350 Size of aprons

(a) The amount of area required for a particular apron layout depends upon the following factors:

(1) the size and maneuverability characteristics of the aircraft using the apron;

(2) the volume of traffic using the apron;

(3) clearance requirements;

(4) type of ingress and egress to the aircraft stand;

(5) basic terminal layout or other aerodrome use;

(6) aircraft ground activity requirements; and

(7) taxiways and apron service roads.

(b) Passenger aircraft services that are carried out during the time the aircraft is parked in a stand position include: galley; toilet and potable water service; baggage handling; fueling; provision of air conditioning, oxygen, electrical power supply and starting air; and aircraft towing. Most of these functions have a vehicle and/or equipment associated with them, or have some type of fixed installation established to conduct these services. Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays, paragraph 3.4.6.

(c) Consideration should be given to providing sufficient area on the starboard side of the aircraft to support the level of activity that take place in the turnaround operation. Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

CS ADR-DSN.E.355 Strength of aprons

Each part of an apron shall be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron will be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

GM1 ADR-DSN.E.355 Strength of aprons

(a) Apron pavement protection against fuel: On aircraft stands, pavement surface in bituminous concrete and joints between concrete slabs should be protected from fuel effects.

(b) Fuel on bituminous concrete provokes a disintegration of the concrete which becomes a kind of dark powder. On aircraft stands, it is not rare to have fuel on the pavement surface, due to leakage from aircraft or refuelling devices or due to a wrong move during refuelling. Therefore, if the aircraft stand pavement is in bituminous concrete, a specific protection is to be considered, such as:

(1) a surface protection consisting in an overlay with a material inert against fuel; or

(2) a product incorporated in the mass of the bituminous concrete during its fabrication, protecting aggregates and binder.

(c) The first solution has the disadvantages to be fragile against stamping effects due to aircraft at the stand but is very useful for existing pavement protection.

(d) Considering the stamping due to aircraft at stands and the weakness of bituminous concrete against fuel, the aircraft stand pavements are often in cement concrete, which offers a much better resistance to stamping and to fuel. Nevertheless, joints between cement concrete slabs could be also damaged by fuel. According to the location of such joints regarding aircraft location and refuelling devices location, it is preferable to manufacture such joints in a material resistant to the fuel.

(e) Additional information on the bearing strength, the design and evaluation of pavements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

CS ADR-DSN.E.360 Slopes on aprons

(a) Slopes on an apron, including those on an aircraft stand taxilane, shall be sufficient to prevent accumulation of water on the surface of the apron but shall be kept to the minimum required to facilitate effective drainage.

(b) On an aircraft stand the maximum slope shall not exceed 1 % in any direction.

GM1 ADR-DSN.E.360 Slopes on aprons

(a) The design of slopes should direct spilled fuel away from building and apron service areas. Where such slopes are unavoidable, special measures should be taken to reduce the fire hazard resulting from fuel spillage.

(b) Slopes on apron have the same purpose as other pavement slopes, meaning to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). Nevertheless, the design of the apron, especially for the parts containing aircraft stands, should specifically take into account the impact of the slopes on the aircraft during its braking at the stand and during its start for departure (with push-back or with its own engines). The aims are, on the one hand, to avoid that an aircraft passes its stop point and goes on the apron service road or to the closest building and on the other hand, to save fuel and optimise the maneuverability of the aircraft or of the push-back device.

(c) Where the slope limitation of 1 % on the stands cannot be achieved, the slope should be kept as shallow as possible and should be such that the operation of the aircraft and vehicles is not compromised.

CS ADR-DSN.E.365 Clearance of distances on aircraft stands

(a) The safety objective of clearance distances on aircraft stands is to provide safe separation between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects.

(b) An aircraft stand shall provide the following minimum clearances between an aircraft entering or exiting the stand and any adjacent building, aircraft on another stand and other objects:

Code Letter	Clearance
A	3 m
B	3 m
C	4.5 m
D	7.5 m

E	7.5 m
F	7.5 m

Table CS-43 : Clearance distances on aircraft Stand

(b) Where the Code Letter is D, E or F, these clearances may be reduced at a stand provided with azimuth guidance by a visual docking guidance system provided that the aircraft stand is a power in push back configuration. The clearance distances shall not be less than:

(1) 2 m between any fixed passenger bridge, and the nose of an aircraft; or

(2) 3.75 m between any object (including other aircraft) and the aircraft over any portion of the stand, provided that all obstacles are clear of the engine ingestion danger area.

GM1 ADR-DSN.E.365 Clearance distances on aircraft stands

(a) Reduced separation on the stand is possible where azimuth guidance by a visual docking guidance system is provided, in combination with additional mitigation measures, such as:

(1) good condition of marking and signage;

(2) maintenance of visual docking systems.

(b) On aircraft stands, where reduced clearance distances are applied:

(1) Guidance by a visual docking guidance system should be provided.

(2) All objects for which reduced clearances apply should be properly marked or lighted (see Chapter Q Visual Aids for Denoting Obstacles).

(3) Aircraft stands where reduced clearance distances apply should be identified and the information published in the AIP.

(c) Any aircraft passing behind an aircraft parked on an aircraft stand should keep the required clearance distances defined in Table CS-37.

(d) On aprons, consideration also has to be given to the provision of service roads and to manoeuvring and storage area for ground equipment (see the Aerodrome Design Manual (Doc 9157), Part 2, for guidance on storage of ground equipment).

CHAPTER F — ISOLATED AIRCRAFT PARKING POSITION

CS ADR-DSN.F.370 Isolated aircraft parking position

(a) The safety objective of the isolated aircraft parking position is to provide safe separation between aircraft that need isolation and other aerodrome activities.

(b) General: An isolated aircraft parking position shall be designated by the aerodrome operator for parking of aircraft that needs isolation from normal aerodrome activities.

(c) Location: The isolated aircraft parking position should be located at the maximum distance practicable and in any case shall never be less than 100 m from other parking positions, buildings, or public areas, etc.

(d) Aerodrome Operator shall ensure that the Air Traffic Services Unit is advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities.

GM1 ADR-DSN.F.370 Isolated aircraft parking position

Care should be taken to ensure that the parking position is not located over underground utilities, such as gas and aviation fuel and, to the extent feasible, electrical or communication cables. The aerodrome control tower should be advised of an area or areas suitable for the parking of an aircraft.

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CHAPTER H — OBSTACLE LIMITATION SURFACES

CS ADR-DSN.H.405 Applicability

The purpose of the obstacle limitation surfaces is to define the airspace around aerodromes to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely.

GM1 ADR-DSN.H.405 Applicability

(a) The obstacle limitation surfaces define the limits to which objects may project into the airspace. Each surface is related to one or more phases of a flight, and provides protection to aircraft during that phase.

(b) The OLS also help to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes.

(c) The effective utilisation of an aerodrome may be considerably influenced by natural features and man-made constructions outside its boundary. These may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons, certain areas of the local airspace should be regarded as integral parts of the aerodrome environment.

(d) Objects which penetrate the obstacle limitation surfaces may in certain circumstances cause an increase in the obstacle clearance altitude/height for an instrument approach procedure or any associated visual circling procedure or have other operational impact on flight procedure design. Criteria for flight procedure design are contained in the Procedures for Air Navigation Services — Aircraft Operations (ICAO, PANS-OPS, Doc 8168).

(e) In ideal circumstances all the surfaces should be free from obstacles but when a surface is infringed, any safety measures required should have regard to:

(1) the nature of the obstacle and its location relative to the surface origin, to the extended centre line of the runway or normal approach and departure paths, and to existing obstructions;

(2) the amount by which the surface is infringed;

(3) the gradient presented by the obstacle to the surface origin;

(4) the type of air traffic at the aerodrome; and

(5) the instrument approach procedures published for the aerodrome.

(f) Safety measures could be as follows:

(1) promulgation in the AIP of appropriate information;

(2) marking and/or lighting of the obstacle;

(3) variation of the runway distances declared as available;

(4) limitation of the use of the runway to visual approaches only;

(5) restrictions on the type of traffic.

(g) In addition to the requirements described in the certification specifications of Chapter H, it may be necessary to call for other restrictions to development and construction on and in the vicinity of the aerodrome in order to protect the performance of visual and electronic aids to navigation and to ensure that such development does not adversely affect instrument approach procedures and the associated obstacle clearance limits.

CS ADR-DSN.H.410 Outer horizontal surface

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GM1 ADR-DSN.H.410 Outer horizontal surface

(a) The outer horizontal surface should extend from the periphery of the conical surface as shown in Figure H-1. An outer horizontal surface is a specified portion of a horizontal plane around an aerodrome beyond the limits of the conical surface. It represents the level above which consideration needs to be given to the control of new obstacles in order to facilitate practicable and efficient instrument approach procedures, and together with the conical and inner horizontal surfaces to ensure safe visual manoeuvring in the vicinity of an aerodrome.

(b) The outer horizontal surface is of particular importance for safe operations in areas of high ground or where there are concentrations of obstacles.

(c) Operational problems can arise from the erection of tall structures in the vicinity of aerodromes beyond the areas currently recognised in these aerodrome regulations and ICAO Annex 14 as areas in which restriction of new construction may be necessary. Such problems may be addressed through the provision of an outer horizontal surface, which is a specified portion of

a horizontal plane around an aerodrome beyond the limits of the conical surface.

(d) As a broad specification for the outer horizontal surface, tall structures can be considered to be of possible significance if they are both higher than 30 m above local ground level, and higher than 150 m above aerodrome elevation within a radius of 15 000 m of the centre of the airport where the runway code number is 3 or 4. The area of concern may need to be extended to coincide with the PANS OPS obstacle areas for the individual approach procedures at the airport under consideration.

(e) If it is of particular importance for safe operation on circuits, arrival routes towards the aerodrome or on departure or missed approach climb-paths, an Outer Horizontal Surface for non-precision approach runways should be established.

(f) Guidance on Outer Horizontal Surface is included in ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

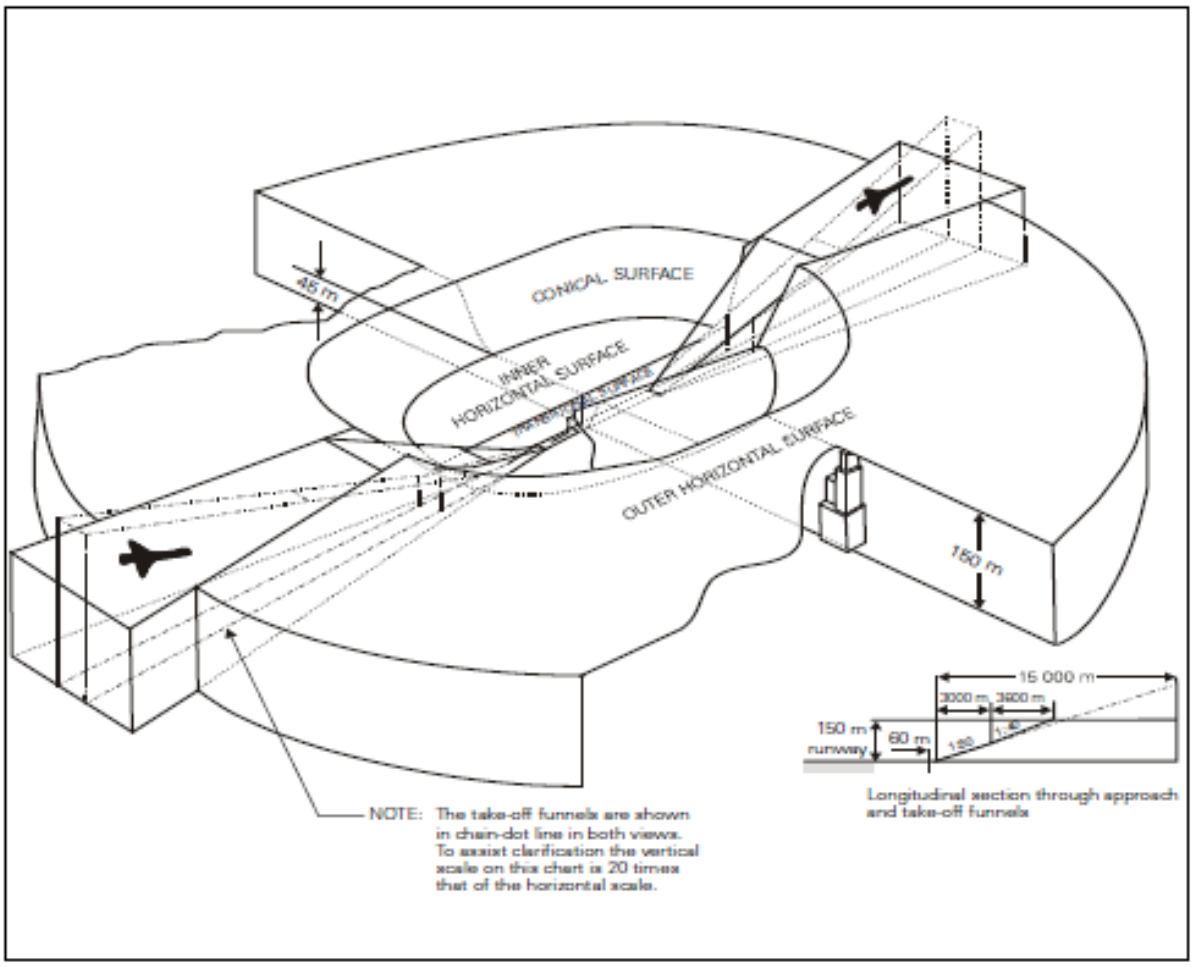


Figure CS-49: Disposition of Outer Horizontal Surface

CS ADR-DSN.H.415 Conical surface

(a) Applicability: The purpose of the conical surface is to facilitate safe visual manoeuvring in the vicinity of the aerodrome.

(b) Description: A surface sloping upwards and outwards from the periphery of the inner horizontal surface.

(c) Characteristics: The limits of the conical surface shall comprise:

(1) a lower edge coincident with the periphery of the inner horizontal surface; and

(2) an upper edge located at a specified height above the inner horizontal surface.

(d) The slope of the conical surface shall be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

CS ADR-DSN.H.420 Inner horizontal surface

(a) Applicability: The purpose of the inner horizontal surface is to protect airspace for visual manoeuvring prior to landing.

(b) Description: A surface located in a horizontal plane above an aerodrome and its environs.

(c) Characteristics: The radius or outer limits of the inner horizontal surface are defined by a circle centred on the geometric centre of the runway, by a convex contour composed of circular arcs centred on the intersections of the extended RWY centre line with the end of the RWY strip, joined tangentially by straight lines parallel to the runway centre line, as shown in Figure CS-49.

(d) The height of the inner horizontal surface shall be measured above an established elevation datum. The elevation datum used for the height of the inner horizontal surface shall be:

(1) the elevation of the highest point of the lowest threshold of the related runway; or

(2) the elevation of the highest point of the highest threshold of the related runway; or

(3) the elevation of the highest point of the runway; or

(4) the aerodrome elevation.

GM1 ADR-DSN.H.420 Inner horizontal surface

(a) The shape of the inner horizontal surface need not necessarily be circular. Guidance on determining the extent of the inner horizontal surface is contained in the ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

(b) The limits of the inner horizontal surface for longer runways (1 800 m or more in length) are defined as circles of radius 4 000 m centred on the strip ends of the runway. These circles are joined by common tangents parallel to the runway centre line to form a racetrack pattern. The boundary of this pattern is the boundary of the inner horizontal surface.

(c) For runways less than 1 800 m in length, the inner horizontal surface may be defined as a circle centred on the midpoint of the runway.

(d) To protect two or more runways, a more complex pattern could become necessary. In this situation, all the circles are joined tangentially by straight lines: illustrated at the Figure CS-50.

(e) For relatively level runways the selection of elevation datum location is not critical, but when

the thresholds differ by more than 6 m, the elevation datum should regard to the factors as the elevation of the most frequent used altimeter setting datum points, minimum circling altitudes in use or required and the nature of operations at the aerodrome. For more complex inner horizontal surfaces, with runways on different levels, as shown in Figure CS-50, a common elevation is not essential, but where surfaces overlap, the lower surface should be regarded as dominant.

(f) Further guidance is given in ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

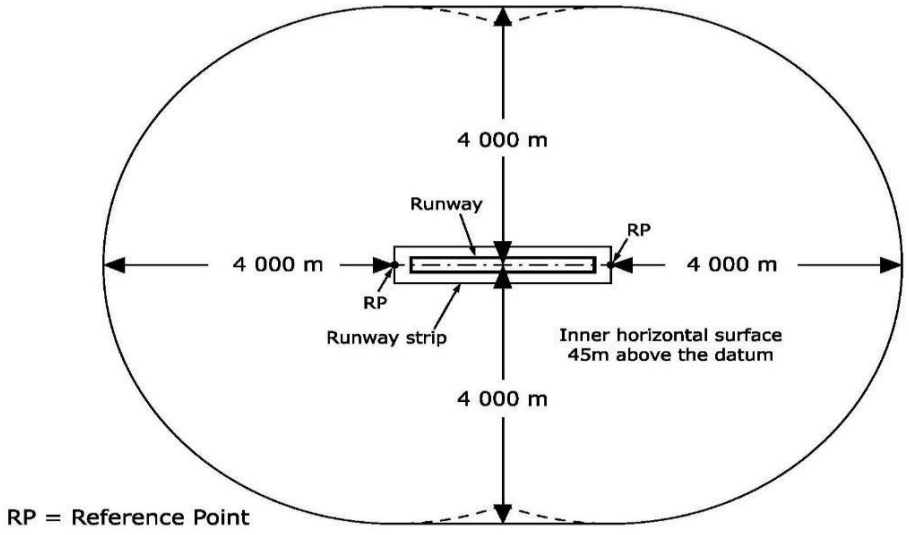


Figure CS-50: Inner horizontal surface where the runway is code 4

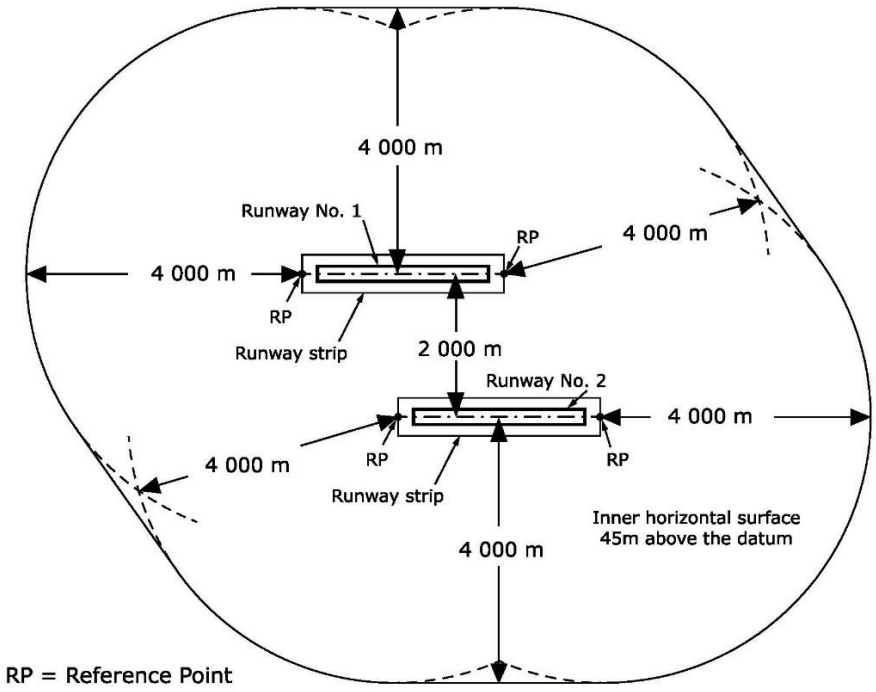


Figure CS-51: Composite inner horizontal surface for two parallel runways (where the runway code is 4)

CS ADR-DSN.H.425 Approach surface

(a) The purpose of the approach surface is to protect an aircraft during the final approach to the runway by defining the area that should be kept free from obstacles to protect an aeroplane in the final phase of the approach-to-land manoeuvre.

(b) Description: An inclined plane or combination of planes preceding the threshold.

(c) Characteristics. The limits of the approach surface shall comprise:

(1) an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway, and located at a specified distance before the threshold;

(2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway; and

(3) an outer edge parallel to the inner edge.

(d) The above surfaces shall be varied when lateral offset, offset or curved approaches are utilised, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

(e) The elevation of the inner edge shall be equal to the elevation of the mid-point of the threshold.

(f) The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the runway and shall continue containing the centre line of any lateral offset or curved ground track.

CS ADR-DSN.H.430 Transitional surface

(a) The purpose of the transitional surface is to define the limit of the area available for buildings, other structures or natural obstructions, such as trees.

(b) Description: A complex surface along the side of the strip and part of the side of the approach surface that slopes upwards and outwards to the inner horizontal surface.

(c) Characteristics: The limits of a transitional surface shall comprise:

(1) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line; and

(2) an upper edge located in the plane of the inner horizontal surface.

(d) The elevation of a point on the lower edge shall be:

(1) along the side of the approach surface — equal to the elevation of the approach surface at that point; and

(2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

(e) The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

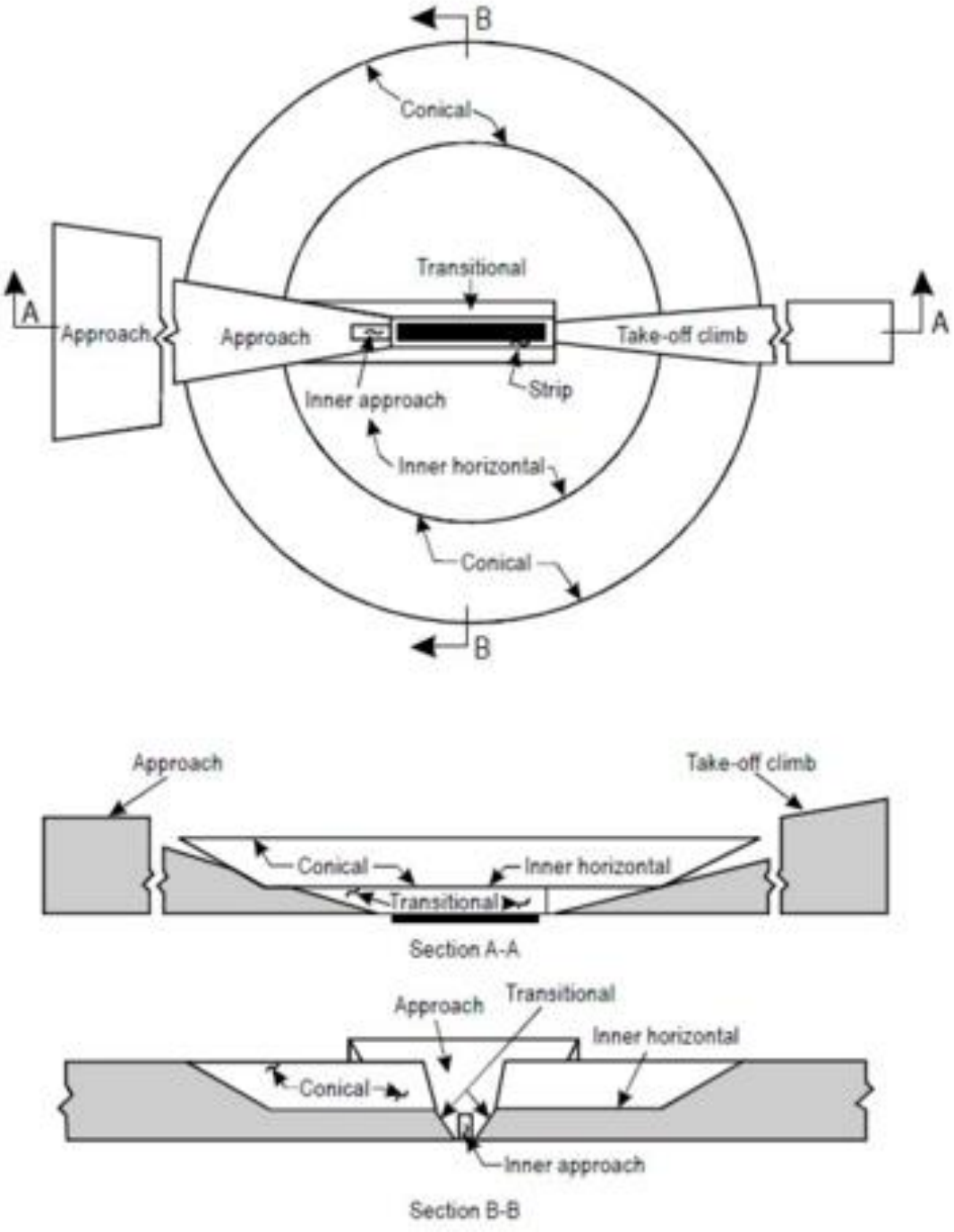


Figure CS-52: Obstacle Limitation Surfaces

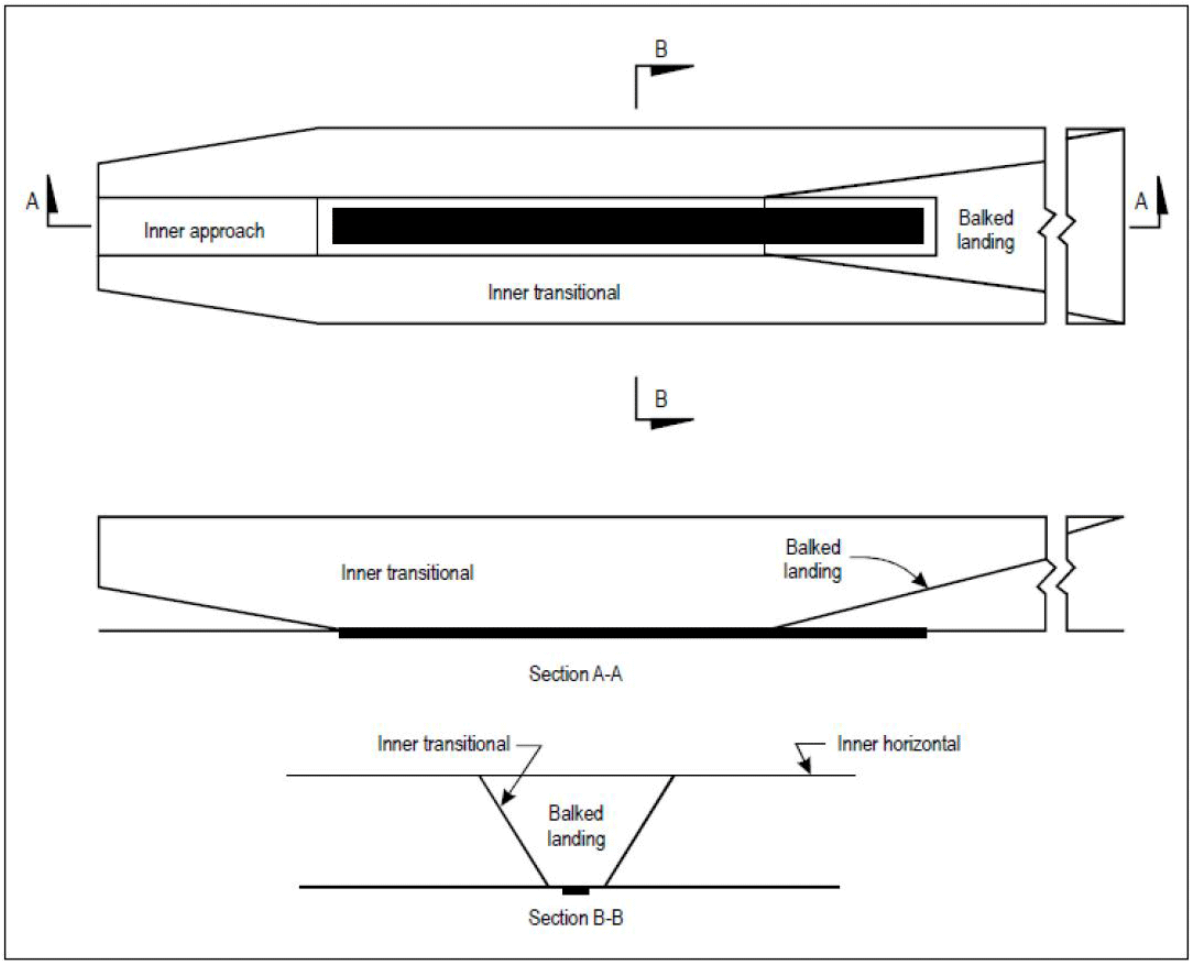


Figure CS-53: Inner approach , Inner transitional and balked landing surfaces

GM1 ADR-DSN.H.430 Transitional surface

When the elevation of a point on the lower edge is along the strip and equal to the elevation of the nearest point on the centre line of the runway or its extension as a result the transitional surface along the strip should be curved if the runway profile is curved, or a plane if the runway profile is a straight line. The intersection of the transitional surface with the inner horizontal surface should also be a curved or a straight line depending on the runway profile.

CS ADR-DSN.H.435 Take-off climb surface

(a) The purpose of the take-off climb surface is to protect an aircraft on take-off and during climb-out.

(b) Description: An inclined plane or other specified surface beyond the end of a runway or clearway.

(c) Characteristics: The limits of the take-off climb surface shall comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway, and located either at a specified distance beyond the end of the runway, or at the end of the clearway when such is provided, and its length exceeds the specified distance;

(2) two sides originating at the ends of the inner edge, diverging uniformly at a specified rate from the take-off track to a specified final width and continuing thereafter at that width for the remainder of the length of the take-off climb surface; and

(3) an outer edge horizontal and perpendicular to the specified take-off track.

(d) The elevation of the inner edge shall be equal to the highest point on the extended runway centre line between the end of the runway and the inner edge, except that when a clearway is provided, the elevation shall be equal to the highest point on the ground on the centre line of the clearway.

(e) In the case of a straight take-off flight path, the slope of the take-off climb surface shall be measured in the vertical plane containing the centre line of the runway.

CS ADR-DSN.H.440 Slewed take-off climb surface

In the case of a take-off flight path involving a turn, the take-off climb surface shall be a complex surface containing the horizontal normals to its centre line, and the slope of the centre line should be the same as that for a straight take-off flight path.

GM1 ADR-DSN.H.440 Slewed take-off climb surface

The edge of a Take-off climb surface may be slewed in the direction of a turn away from the extended runway centre line up to a maximum of 15° splay. The portion of take-off climb surface encompassing the new departure track should be the same shape and dimensions as the original take-off climb surface measured relative to the new departure track. The opposite edge of the take-off climb surface should remain unchanged unless there is another turning departure towards that side as well, in which case, the edge may be slewed in that direction too.

CS ADR-DSN.H.445 Obstacle free zone (OFZ)

(a) An OFZ is intended to protect aeroplanes from fixed and mobile obstacles during Category II and III operations when approaches are continued below decision height, and during any subsequent missed approach or balked landing with all engines operating normally. It is not intended to supplant the requirement of other surfaces or areas where these are more demanding.

(b) The OFZ is made up of the following obstacle limitation surfaces:

(1) inner approach surface;

(2) inner transitional surfaces; and

(3) balked landing surface.

CS ADR-DSN.H.450 Inner approach surface

(a) The purpose of the inner approach surface is to protect final precision approaches.

(b) Description: A rectangular portion of the approach surface immediately preceding the threshold.

(c) Characteristics: The limits of the inner approach surface shall comprise:

(1) an inner edge coincident with the location of the inner edge of the approach surface but of its own specified length;

(2) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge.

CS ADR-DSN.H.455 Inner transitional surface

(a) The purpose of the inner transitional surface is to protect aeroplanes during precision approaches and balked landing. It is intended that the inner transitional surface be the controlling obstacle limitation surface for navigation aids, aircraft and other vehicles that must be near the runway and which is not to be penetrated except for frangible objects.

(b) Description: A surface similar to the transitional surface but closer to the runway.

(c) Characteristics: The limits of an inner transitional surface shall comprise:

(1) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface, and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and

(2) an upper edge located in the plane of the inner horizontal surface.

(d) The elevation of a point on the lower edge shall be:

(1) along the side of the inner approach surface and balked landing surface — equal to the elevation of the particular surface at that point; and

(2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

(e) The slope of the inner transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

GM1 ADR-DSN.H.455 Inner transitional surface

(a) While the intend of the inner transitional surface is as mentioned in ADR-DSN.H.455(a), the transitional surface is intended to remain as the controlling obstacle limitation surface for buildings, etc.

(b) The inner transitional surface along the strip should be curved if the runway profile is curved or a plane if the runway profile is a straight line. The intersection of the inner transitional surface with the inner horizontal surface should also be a curved or straight line depending on the runway profile.

CS ADR-DSN.H.460 Balked landing surface

(a) The purpose of the balked landing surface is to protect balked landing.

(b) Description: An inclined plane located at a specified distance after the threshold, extending between the inner transitional surfaces.

(c) Characteristics: The limits of the balked landing surface shall comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway and located at a specified distance after the threshold;

(2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

(d) The elevation of the inner edge shall be equal to the elevation of the runway centre line at the location of the inner edge.

(e) The slope of the balked landing surface shall be measured in the vertical plane containing the centre line of the runway.

CHAPTER I — (intentionally left blank)

CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

CS ADR-DSN.J.465 General

Obstacle limitation requirements shall be distinguished between:

(a) Non-instrument runways;

(b) Non-precision approach runways;

(c) Precision approach runways; and

(d) Runways meant for take-off.

GM1 ADR-DSN.J.465 General

The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a runway, i.e. take-off or landing, and type of approach, and are intended to be applied when such use of the runway is made. In cases where operations are conducted to or from both directions of a runway, the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

CS ADR-DSN.J.470 Non-instrument runways

(a) The following obstacle limitation surfaces shall be established for a non-instrument runway:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface; and

(4) transitional surfaces.

(b) The heights and slopes of the surfaces shall-not be greater than, and their other dimensions not less than, those specified in Table J-1.

(c) New objects or extensions of existing objects shall not be permitted above an approach or transitional surface except when in the opinion of the appropriate authority the new object or extension would be shielded by an existing immovable object.

(d) New objects or extensions of existing objects shall not be permitted above the conical surface or inner horizontal surface except when in the opinion of the appropriate authority , the object would be shielded by an existing immovable object, or if after an aeronautical study, it is determined

that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(e) Existing objects above any of the conical surface, inner horizontal surface, approach surface and transitional surfaces shall, as far as practicable, be removed except when in the opinion of the Appropriate Authority the object is shielded by an existing immovable object, or if after an aeronautical study , it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) In considering proposed construction, account shall be taken of the possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces.

GM1 ADR-DSN.J.470 Non-instrument runways

(a) Circumstances in which the shielding principle may reasonably be applied are described in the ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

(b) Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered that they may endanger aeroplanes.

CS ADR-DSN.J.475 Non-precision approach runways

(a) The following obstacle limitation surfaces shall be established for a non-precision approach runway:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface; and

(4) transitional surfaces.

(b) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table J-1, except in the case of the horizontal section of the approach surface (see paragraph (c) below).

(c) The approach surface shall be horizontal beyond the point at which the 2.5 % slope intersects:

(1) a horizontal plane 150 m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude/height (OCA/H);

whichever is the higher.

(d) New objects or extensions of existing objects shall not be permitted above an approach surface within 3 000 m of the inner edge or above a transitional surface except when in the opinion of the appropriate authority the new object or extension would be shielded by an existing terrain that is impractical to remove.

(e) New objects or extensions of existing objects shall not be permitted above the approach surface beyond 3 000 m from the inner edge, the conical surface or inner horizontal surface except when the object would be shielded by an existing immovable object, or after an aeronautical study, it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) Existing objects above any of the surfaces required by paragraph (a) should as far as practicable be removed except when, the opinion of the appropriate authority, the object would be shielded by an existing terrain that is impractical to remove, or after an aeronautical study , it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

GM1 ADR-DSN.J.475 Non-precision approach runways

(a) If it is of particular importance for safe operation on circuits, arrival routes towards the aerodrome or on departure or missed approach climb-paths, an outer horizontal surface for non-precision approach runways should be established.

(b) Circumstances in which the shielding principle may reasonably be applied are described in ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

(c) Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach

surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered they may endanger aeroplanes.

CS ADR-DSN.J.480 Precision approach runways

(a) The following obstacle limitation surfaces shall be established for a precision approach runway Category I, II or III:

(1) Conical Surface;

(2) Inner Horizontal Surface;

(3) Approach Surface;

(4) Inner Approach Surface

(5) Transitional Surfaces;

(6) Inner Transitional Surfaces, and

(7) Balked Landing Surface.

(b) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table CS-40, except in the case of the horizontal section of the approach surface in paragraph (d) below.

(c) The approach surface shall be horizontal beyond the point at which the 2.5 % slope intersects:

(1) a horizontal plane 150 m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance limit;

whichever is the higher.

(d) Fixed objects shall not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function must be located on the strip. Mobile objects shall not be permitted above these surfaces during the use of the runway for landing.

(e) New objects or extensions of existing objects shall not be permitted above an approach surface or a transitional surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing terrain that is impractical to remove.

(f) New objects or extensions of existing objects should not be permitted above the Conical Surface and the Inner Horizontal Surface except when, in the opinion of the appropriate authority, an object would be shielded by an existing terrain, or after an aeronautical Study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(g) Existing objects above an Approach Surface, a Transitional Surface, the Conical Surface and Inner Horizontal Surface shall as far as practicable be removed except when, in the opinion of the appropriate authority, an object is shielded by existing terrain, or after an aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

APPROACH RUNWAYS										
RUNWAY CLASSIFICATION										
Surface and dimensions[a]	Non-instrument Code number				Non-precision approach Code number			Precision approach category		
								I Code number		II or III Code numb
	1	2	3	4	1, 2	3	4	1, 2	3, 4	3, 4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CONICAL										
Slope	5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %	5 %
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	-	-	-	-	-	-	-	90 m	120 m[e]	120 m[e]
Distance from threshold	-	-	-	-	-	-	-	60 m	60 m	60 m

Length	-	-	-	-	-	-	-	900 m	900 m	900 m
Slope	-	-	-	-	-	-	-	2.5 %	2 %	2 %
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	140 m	280 m	280 m	140 m	280 m	280 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side	10 %	10 %	10 %	10 %	15 %	15 %	15 %	15 %	15 %	15 %
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5 %	4 %	3.33 %	2.5 %	3.33 %	2 %	2 %	2.5 %	2 %	2 %
Second section										
Length	-	-	-	-	-	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	-	-	-	-	-	2.5 %	2.5 %	3 %	2.5 %	2.5 %
Horizontal section										
Length	-	-	-	-	-	8 400 m[b]	8 400 m[b]	-	8 400 m[b]	8 400 m[b]
Total length	-	-	-	-	-	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20 %	20 %	14.3 %	14.3 %	20 %	14.3 %	14.3 %	14.3 %	14.3 %	14.3 %
INNER TRANSITIONAL										
Slope	-	-	-	-	-	-	-	40 %	33.3 %	33.3 %
BALKED LANDING SURFACE										
Length of inner edge	-	-	-	-	-	-	-	90 m	120 m[e]	120 m[e]
Distance from	-	-	-	-	-	-	-	c	1 800 m[d]	1 800 m[d]
Divergence (each side)	-	-	-	-	-	-	-	10 %	10 %	10 %
Slope	-	-	-	-	-	-	-	4 %	3.33 %	3.33 %

a. All dimensions are measured horizonta unless specified otherwise.

d. Or end of runway whichever is less.

b. Variable length (CS ADR-DSN.J.475(c) or CS ADR-DSN.J.480(d)).	e. Where the code letter is F (Code element 2 of Table A-1), the width is increased to 140 m.
c. Distance to the end of strip.	

Table CS-44: Dimensions and slopes of obstacle limitation surfaces — Approach runways

CS ADR-DSN.J.485 Runways meant for take-off

(a) The safety objective of the take-off climb surface slopes and dimensions is to allow safe take- off operations by defining the limits.

(b) The obstacle limitation surface of Take-of Climb Surface shall be established for a runway meant for take-off.

(c) The dimensions of the surface shall be not less than the dimensions specified in Table CS-41, except that a lesser length may be adopted for the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.

(d) New objects or extensions of existing objects shall not be permitted above a Take-off Climb Surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing terrain that is impractical to remove.

(e) If no object reaches the 2 % (1:50) take-off climb surface, new objects should be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6 % (1:62.5).

(f) Existing objects that extend above a Take-off Climb Surface shall as far as practicable be removed except when, in the opinion of the appropriate authority, an object is shielded by an existing terrain that is impractical to remove, or after an aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

RUNWAYS MEANT FOR TAKE-OFF			
Surface and dimensions[a]	Code number		
	1	2	3 or 4

Length of inner edge	60 m	80 m	180 m
Distance from runway end[b]	30 m	60 m	60 m
Divergence (each side)	10 %	10 %	12.5 %
Final width	380 m	580 m	1 200 m 1 800 m[c]
Length	1 600 m	2 500 m	15 000 m
Slope	5 %	4 %	2 %

a All dimensions are measured horizontally unless specified otherwise.

b The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.

c 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.

Table CS-45: . Dimensions and slopes of obstacle limitation surfaces — Runways meant for take-off

GM1 ADR-DSN.J.485 Runways meant for take-off

(a) When local conditions differ widely from sea level standard atmospheric conditions, it may be advisable for the slope specified in Table CS-41 to be reduced. The degree of this reduction depends on the divergence between local conditions and sea level standard atmospheric conditions, and on the performance characteristics and operational requirements of the aeroplanes for which the runway is intended.

(b) The operational characteristics of aeroplanes for which the runway is intended shall be examined to see if it is desirable to reduce the slope specified in Table CS-41. If the specified slope is reduced, a corresponding adjustment in the length of Take-off Climb Surface should be made so as to provide protection to a height of 300 m.

(c) Circumstances in which the shielding principle may reasonably be applied are described in ICAO Doc 9137, Airport Services Manual, Part 6, Control of Obstacles.

(d) Because of transverse slopes on a strip or clearway, in certain cases portions of the inner edge of

the take-off climb surface may be below the corresponding elevation of the strip or clearway. It is not intended that the strip or clearway be graded to conform with the inner edge of the take-off climb surface, nor is it intended that terrain or objects which are above the take-off climb surface beyond the end of the strip or clearway, but below the level of the strip or clearway, be removed unless it is considered that they may endanger aeroplanes. Similar considerations apply at the junction of a clearway and strip where differences in transverse slopes exist.

CS ADR-DSN.J.486 Other objects

(a) Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids shall, as far as practicable, be removed.

(b) Anything which may, in the opinion of the appropriate authority after an aeronautical study, endanger aeroplanes on the Movement Area or in the air within the limits of the Inner Horizontal and Conical Surfaces shall be regarded as an obstacle and shall be removed as far as practicable.

GM1 ADR-DSN.J.486 Other objects

In certain circumstances, objects that do not project above any of the obstacle limitation surfaces may constitute a hazard to aeroplanes as, for example, where there are one or more isolated objects in the vicinity of an aerodrome.

CS ADR-DSN.J.487 Objects outside the obstacle limitation surfaces

(a) Applicability: The specifications in paragraph (b) below apply to the area under control of the aerodrome operator.

(b) Arrangements shall be made to enable the appropriate authority to be consulted concerning proposed construction beyond the limits of the Obstacle Limitation Surfaces that extend above a height established by that authority, in order to permit an aeronautical Study of the effect of such construction on the operation of aeroplanes.

(c) In areas beyond the limits of the Obstacle Limitation Surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded as obstacles, unless an aeronautical study indicates that they do not constitute a hazard to aeroplanes.

GM1 ADR-DSN.J.487 Objects outside the obstacle limitation surfaces

Aeronautical study may have regard to the nature of operations concerned and may distinguish between day and night operations.

CHAPTER K — VISUAL AIDS FOR NAVIGATION (INDICATORS AND SIGNALLING DEVICES)

CS ADR-DSN.K.490 Wind direction indicator

(a) An aerodrome shall be equipped with a sufficient number of wind direction indicators in order to provide wind information to the pilot during approach and take-off.

(b) Location: Each wind direction indicator shall be located so that at least one wind direction indicator is visible from aircraft in flight, or on the movement area, and in such a way as to be free from the effects of air disturbances caused by nearby objects.

(c) Characteristics:

(1) Each wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m.

(2) It should be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed.

(3) The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m. Having regard to background:

(i) where practicable, a single colour, preferably orange, should be used; and

(ii) where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and shall be arranged in five alternate bands, the first and last bands being the darker colour.

(4) The locations of wind direction indicators should be marked by a circular band 15 m in diameter and 1.2 m wide. The band should be centred about the wind direction indicator support, and should be in a colour chosen to give adequate conspicuity, preferably white.

(d) Night conditions:

Provision shall be made for illuminating a sufficient number of wind indicators at an aerodrome intended for use at night.

GM1 ADR-DSN.K.490 Wind direction indicator

(a) Wind direction indicators are important visual aids for all runway ends. Large wind direction indicators are particularly important at aerodromes where landing information is not available through radio communications. On the other hand, landing direction indicators are seldom used due to the necessity and, consequently, responsibility, of changing their direction as wind direction shifts. Visual ground signals for runway and taxiway serviceability are contained in ICAO Annex 2. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, Chapter 3.

(b) A fabric wind cone is generally the type preferred by pilots because it provides a general indication of wind speed. Cones that extend fully at wind speeds of about 15 kt are most useful since this is the maximum crosswind landing component for small aircraft.

(c) The usefulness of any visual aid is determined largely by its size, conspicuity, and location. Given conditions of good atmospheric visibility, the maximum distance at which the information available from an illuminated wind sleeve can be usefully interpreted is 1 km. Thus, in order that a pilot may make use of this information whilst on approach, the wind sleeve should be sited no farther from the runway threshold than 600 m. Obstacle criteria excluded, the ideal location is 300 m along the runway from the threshold and laterally displaced at 80 m from the runway centre line.

(d) This means, in effect, that only those aerodromes where the thresholds are less than 1 200 m apart can meet the minimum requirement with a single unit. Most code 3 and 4 aerodromes should require two or more units suitably sited in order to provide the best possible coverage.

(e) The final choice of unit numbers and location should depend on a number of factors which should vary from aerodrome to aerodrome. However, when deciding on the most appropriate location, account should be taken to ensure that the wind direction indicator is:

(1) outside the Cleared and Graded Area of the runway and taxiway strips;

(2) clear of the OFZ and ILS critical/sensitive areas where appropriate;

(3) preferably not more than 200 m lateral displacement from the runway edge;

(4) preferably between 300 m and 600 m from the runway threshold measured along the runway;

(5) in an area with low background levels of illumination;

(6) visible from the approach and take-off positions of all runways; and

(7) free from the effects of air disturbance caused by nearby objects.

CS ADR-DSN.K.495 Landing direction indicator

(a) Location: Where provided, a landing direction indicator shall be located in a conspicuous place on the aerodrome.

(b) Characteristics:

(1) The landing direction indicator should be in the form of a 'T'.

(2) The shape and minimum dimensions of a landing 'T' shall be as shown in Figure CS-53.

(3) The colour of the landing 'T' shall be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed.

(4) Where used at night, the landing 'T' shall either be illuminated or outlined by white lights.

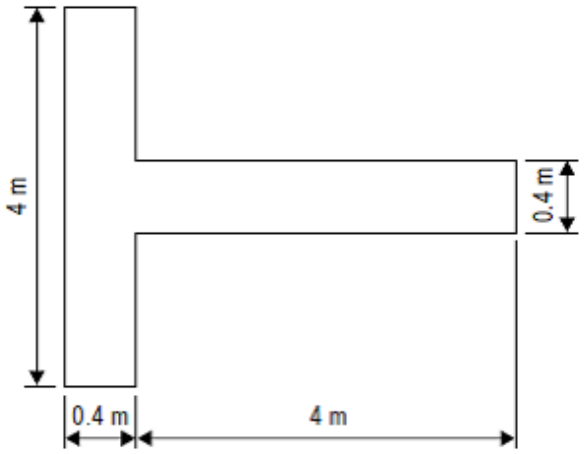


Figure CS-54 : Landing direction indicator

GM1 ADR-DSN.K.495 Landing direction indicator

The landing 'T' may be constructed of wood or other light material and its dimensions may correspond to those shown in Figure K-1. It may be painted white or orange. The landing 'T' should be mounted on a

cement concrete pedestal adequately reinforced with steel bars to avoid cracks resulting from unequal settlement. The surface of the pedestal should be finished smooth with a steel trowel and coated with paint of appropriate colour. The colour of the pedestal should be chosen to contrast with the colour of the landing 'T'. Before fastening the landing 'T' base to the concrete pedestal, the mounting bolts should be checked for correct spacing. The landing 'T' should be assembled and mounted in accordance with the manufacturer's installation instructions. It should be free to move about a vertical axis so that it can be set in any direction. Where required for use at night, the landing 'T' should either be illuminated or outlined by white lights.

CS ADR-DSN.K.500 Signalling lamp

(a) A signalling lamp shall be provided at a controlled aerodrome.

(b) Characteristics:

(1) A signalling lamp should be capable of producing red, green and white signals, and of:

(i) being aimed at any target as required; and

(ii) giving a signal in any one colour followed by a signal in either of the two other colours.

(iii) transmitting a message in any one of the three colours by Morse Code up to a speed of at least four words per minute.

(2) The beam spread should be not less than 1° or greater than 3°, with negligible light beyond 3°. When the signalling lamp is intended for use in the daytime, the intensity of the coloured light should be not less than 6 000 cd.

GM1 ADR-DSN.K.500 Signalling lamp

When selecting the green light, use should be made of the restricted boundary of green as specified in GM1 ADR-DSN.U.930(a).

CS ADR-DSN.K.505 Signal panels and signal area

The inclusion of detailed specifications for a signal area in this section is not intended to imply that one has to be provided.

(a) Location: When provided, a signal area should be located so as to be visible for all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300 m.

(b) Characteristics:

(1) The signal area shall be an even horizontal surface at least 9 m square.

(2) The signal area should be constructed of cement concrete reinforced with an adequate quantity of steel to avoid cracks resulting from unequal settlement. The top surface should be finished smooth with a steel trowel and coated with paint of appropriate colour. The colour of the signal area shall be chosen to contrast with the colours of the signal panels to be displayed thereon.

(3) The colour of the signal area should be chosen to contrast with the colours of the signal panels used, and it shall be surrounded by a white border not less than 0.3 m wide.

GM1 ADR-DSN.K.505 Signal panels and signal area

(a) A signal panels and signal area should be provided when visual ground signals are used to communicate with aircraft in flight.

(b) A signal panel and signal area may be needed when the aerodrome does not have an aerodrome control tower or an aerodrome flight information service unit, or when the aerodrome is used by aeroplanes not equipped with radio. Visual ground signals may also be useful in the case of failure of two-way radio communication with aircraft. It should be recognised, however, that the type of information which may be conveyed by visual ground signals should normally be available in AIP or NOTAM. The potential need for visual ground signals should, therefore, be evaluated before deciding to provide a signal area.

(c) ICAO Annex 2, Appendix 1, specifies the shape, colour and use of visual ground signals.

(d) The Aerodrome Design Manual (Doc 9157), Part 4, provides guidance on their design.

CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

CS ADR-DSN.L.520 General – Colour and conspicuity

Markings shall be of a conspicuous colour and contrast with the surface on which they are laid.

(a) Runway markings shall be white.

(b) Markings for taxiways, runway turn pads, and aircraft stands shall be yellow.

(c) Apron safety lines shall be of a conspicuous colour which shall contrast with that used for aircraft stand markings.

(d) At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings

(e) When it is operationally necessary to apply temporary runway or taxiway markings, those markings shall comply with the relevant CS.

GM1 ADR-DSN.L.520 General – Colour and conspicuity

(a) Where there is insufficient contrast between the marking and the pavement surface, the marking should include an appropriate border. It has been found that, on runway surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black.

(b) It is preferable that the risk of uneven friction characteristics on markings be reduced in so far as practicable by the use of a suitable kind of paint.

(c) Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.

(d) Guidance on reflective materials is given in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.L.525 Runway designation marking

(a) Applicability: A runway designation marking shall be provided at the thresholds of a paved runway.

(b) A runway designation marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

(c) Location and positioning: A runway designation marking shall be located at a threshold as shown in Figure CS-54 as appropriate.

(d) Characteristics:

(1) A runway designation marking shall consist of a two-digit number and on parallel runways shall be supplemented with a letter.

(i) On a single runway, dual parallel runways and triple parallel runways, the two-digit number shall be the whole number nearest the one-tenth of the magnetic north when viewed from the direction of approach.

(ii) On four or more parallel runways, one set of adjacent runways shall be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth.

(iii) When the above rule would give single digit number, it shall be preceded by a zero.

(2) In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

(i) for two parallel runways: 'L' 'R';

(ii) for three parallel runways: 'L' 'C' 'R';

(iii) for four parallel runways: 'L' 'R' 'L' 'R';

(iv) for five parallel runways: 'L' 'C' 'R' 'L' 'R' or
'L' 'R' 'L' 'C' 'R'; and

(v) for six parallel runways: 'L' 'C' 'R' 'L' 'C' 'R'.

(3) The numbers and letters shall be in the form and proportion shown in Figure CS-55. The dimensions shall be not less than those shown in Figure CS-55. Where the numbers are incorporated in the threshold marking, larger dimensions shall be used in order to fill adequately the gap between the stripes of the threshold marking.

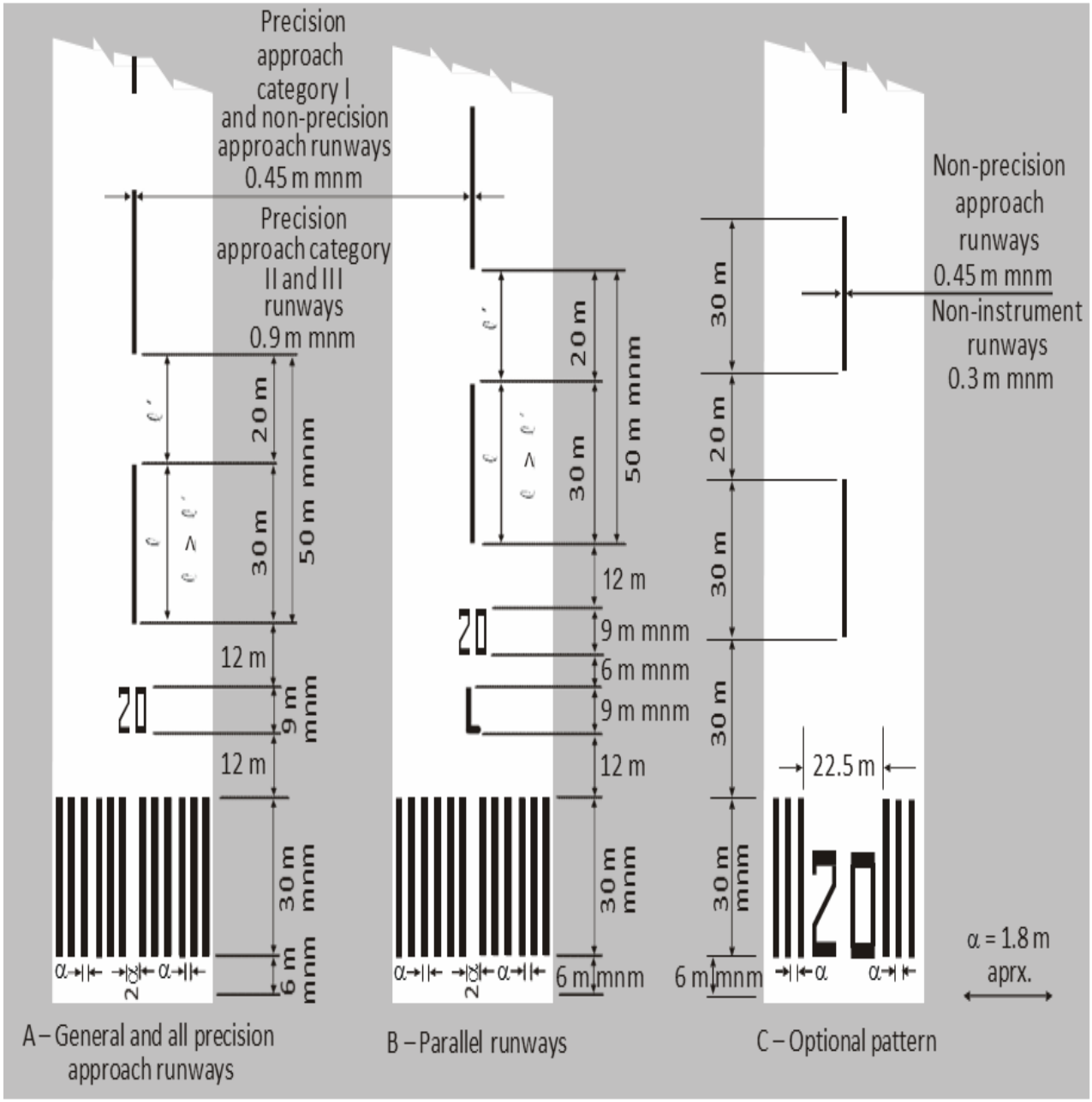


Figure CS-55: Runway designation, centre line and threshold markings

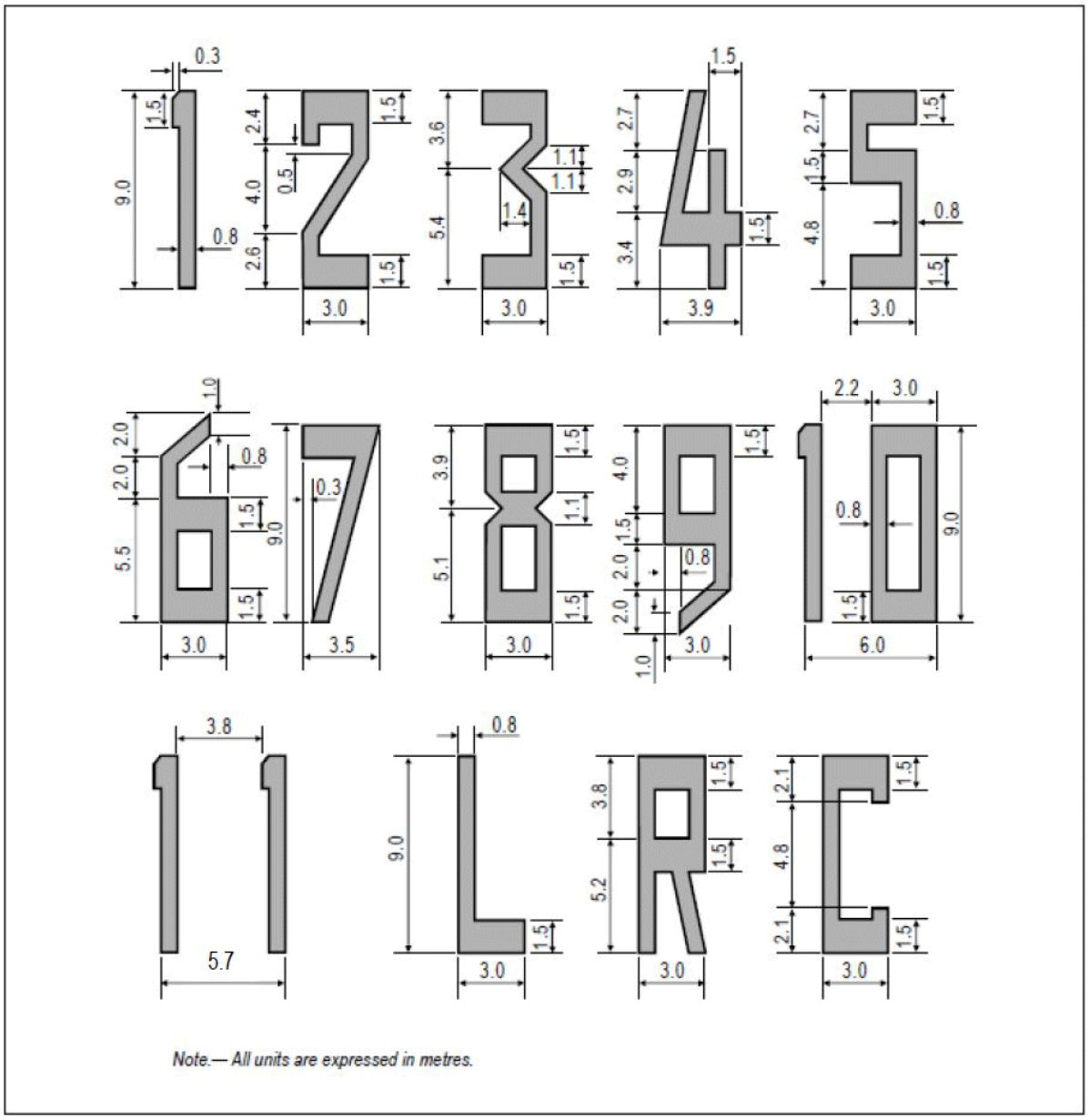


Figure CS-56: Form and proportions of numbers and letters for runway designation markings

GM1 ADR-DSN.L.525 Runway designation marking

If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

CS ADR-DSN.L.530 Runway centre line marking

(a) Applicability: A runway centre line marking shall be provided on a paved runway.

(b) Location: A runway centre line marking shall be located along the centre line of the runway between the runway designation marking as shown in Figure CS-54, except when interrupted as given in CS ADR-DSN.L.560.

(c) Characteristics:

(1) A runway centre line marking shall consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap shall be not less than 50 m or more than 75 m. The length of each stripe shall be at least equal to the length of the gap or 30 m, whichever is greater.

(2) The width of the stripes shall be not less than:

(i) 0.90 m on precision approach Category II and III runways;

(ii) 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach Category I runways; and

(iii) 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

GM1 ADR-DSN.L.530 Runway centre line marking

For the centre line marking the 30 m length of and gap between stripes may be adjusted to take into consideration the runway thresholds locations.

CS ADR-DSN.L.535 Threshold marking

(a) Applicability: threshold marking shall be provided at the threshold of a paved runway, where the code number is 3 or 4;

(b) A threshold marking should be provided, so far as practicable, at the thresholds of an unpaved runway.

(c) Location: The stripes of the threshold marking shall commence 6 m from the threshold.

(d) Characteristics:

(1) A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure CS-54(A) and CS-54(B). The number of stripes shall be in accordance with the runway width as follows:

Runway width	Number of stripes
18 m	4

23 m	6
30 m	8
45 m	12
60 m	16

Table CS-46: Number of threshold marking stripes

except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Figure CS-54(C).

(2) The stripes shall extend laterally to within 3 m of the edge of a runway or to a distance of 27 m on either side of a runway centre line, whichever results in the smaller lateral distance.

(3) Where a runway designation marking is placed within a threshold marking, there shall be a minimum of three stripes on each side of the centre line of the runway.

(4) Where a runway designation marking is placed above a threshold marking, the stripes shall be continued across the runway. The stripes shall be at least 30 m long and approximately 1.80 m wide with spacings of approximately 1.80 m between them. Where the stripes are continued across a runway, a double spacing shall be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking, this spacing shall be 22.5 m.

(e) Displaced threshold:

(1) Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Figure CS-56(B) should be added to the threshold marking.

(2) A transverse stripe shall be not less than 1.80 m wide.

(3) Where a runway threshold is permanently displaced, arrows conforming to Figure CS-56(B) shall be provided on the portion of the runway before the displaced threshold.

(4) When a runway threshold is temporarily displaced from the normal position, it shall be

marked as shown in Figure CS-56(A) or CS-56(B), and all markings prior to the displaced threshold shall be obscured except the runway centre line marking which shall be converted to arrows.

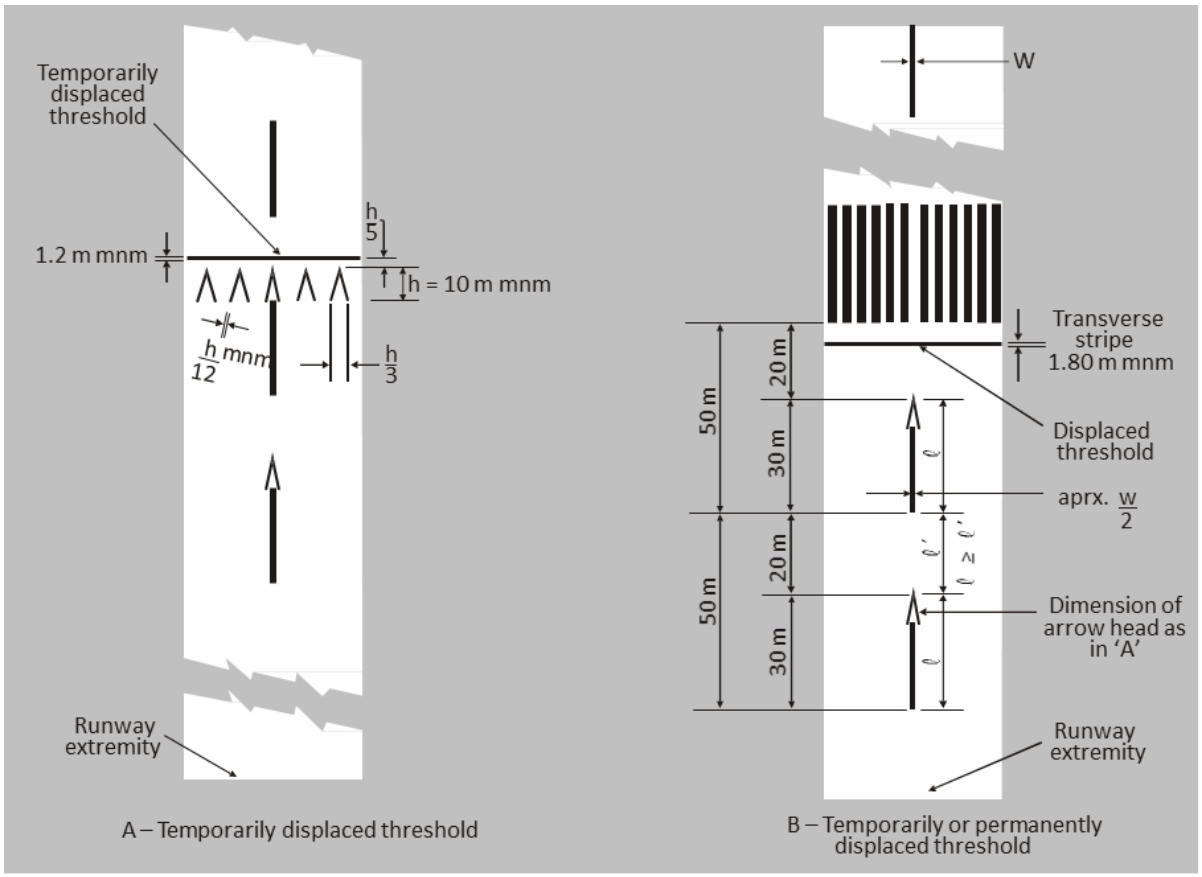


Figure CS-57: Displaced threshold markings

GM1 ADR-DSN.L.535 Threshold marking

(a) The Aerodrome Design Manual (Doc 9157), Part 4, shows a form of marking which has been found satisfactory for the marking of downward slopes immediately before the threshold.

(b) In the case where a threshold is temporarily displaced for only a short period of time, it has been found satisfactory to use markers in the form and colour of a displaced threshold marking rather than attempting to paint this marking on the runway.

CS ADR-DSN.L.540 Aiming point marking

(a) Applicability: An aiming point marking shall be provided at each approach end of an instrument runway where the code number is 2, 3, or 4.

(b) An aiming point marking shall be provided when additional conspicuity of the aiming point is

required at each approach end of:

(1) a non-Instrument Runway where the Code Number is 3 or 4,

(2) an instrument Runway where Code Number is 1.

(c) An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of table CS-43.

(d) Where a touchdown zone marking is provided, the lateral spacing between the markings shall be the same as that of the touch-down zone marking.

(e) Characteristics. The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table CS-43, except that, on a runway equipped with a PAPI system, the beginning of the marking should be coincident with the visual approach slope origin.

Location and dimensions	Landing distance available			
	Less than 800 m	800 m up to but not including 1 200 m	1 200 m up to but not including 2 400 m	2 400 m and above
Distance from threshold to beginning of	150 m	250 m	300 m	400 m
Length of stripe[b]	30-45 m	30-45 m	45-60 m	45-60 m
Width of stripe	4 m	6 m	6-10 m[c]	6-10 m[c]
Lateral spacing between inner sides of stripes	6 m[d]	9 m[d]	18-22.5 m	18-22.5 m

a	Where a PAPI system is provided for the runway, the beginning of the marking should be coincident with the visual approach slope origin.
b	Where greater dimensions of the specified ranges are intended to be used where increased conspicuity is required.
c	Where lateral spacing may be varied within these limits to minimise the contamination of the marking by rubber deposits.
d	These figures were deduced by reference to the outer main gear wheel span which is element 2 of the aerodrome reference code

Table CS-47: Location and dimensions of aiming point marking

GM1 ADR-DSN.L.540 Aiming point marking

For runways with widths of 30 m, the width of the rectangular stripes of the aiming point marking and the lateral spacing between the inner sides of the stripes may be adjusted in proportion to the available runway width to avoid overlapping of the aiming point marking with the runway side stripe marking.

CS ADR-DSN.L.545 Touchdown zone marking

(a) Applicability: touchdown zone marking shall be provided in the touchdown zone of a precision approach runway where the code number is 2, 3, or 4.

A touchdown zone marking should be provided in the touchdown zone of a paved non- precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable.

(b) Location: A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Landing distance available or the distance between thresholds	Pair(s) of markings
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3

1 500 m up to but not including 2 400 m	4
2400 m or more	6

Table CS-48: Pairs of touchdown zone marking

(c) Characteristics:

1) A touchdown zone marking shall conform to either of the patterns shown in Figure CS-57. For the pattern shown in Figure CS-57(A), the markings shall be not less than 22.5 m long and 3 m wide. For the pattern shown in Figure CS-57(B), each stripe of each marking shall be not less than 22.5 m long and 1.8 m wide with spacing of 1.5 m between adjacent stripes.

2) The lateral spacing between the inner sides of the rectangles shall be equal to that of the aiming point marking where provided. Where an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles shall correspond to the lateral spacing specified for the aiming point marking in Table CS-43, as appropriate. The pairs of markings shall be provided at longitudinal spacings of 150 m beginning from the threshold, except that pairs of touchdown zone markings coincident with or located within 50 m of an aiming point marking shall be deleted from the pattern.

3) On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes should be provided 150 m beyond the beginning of the aiming point marking.

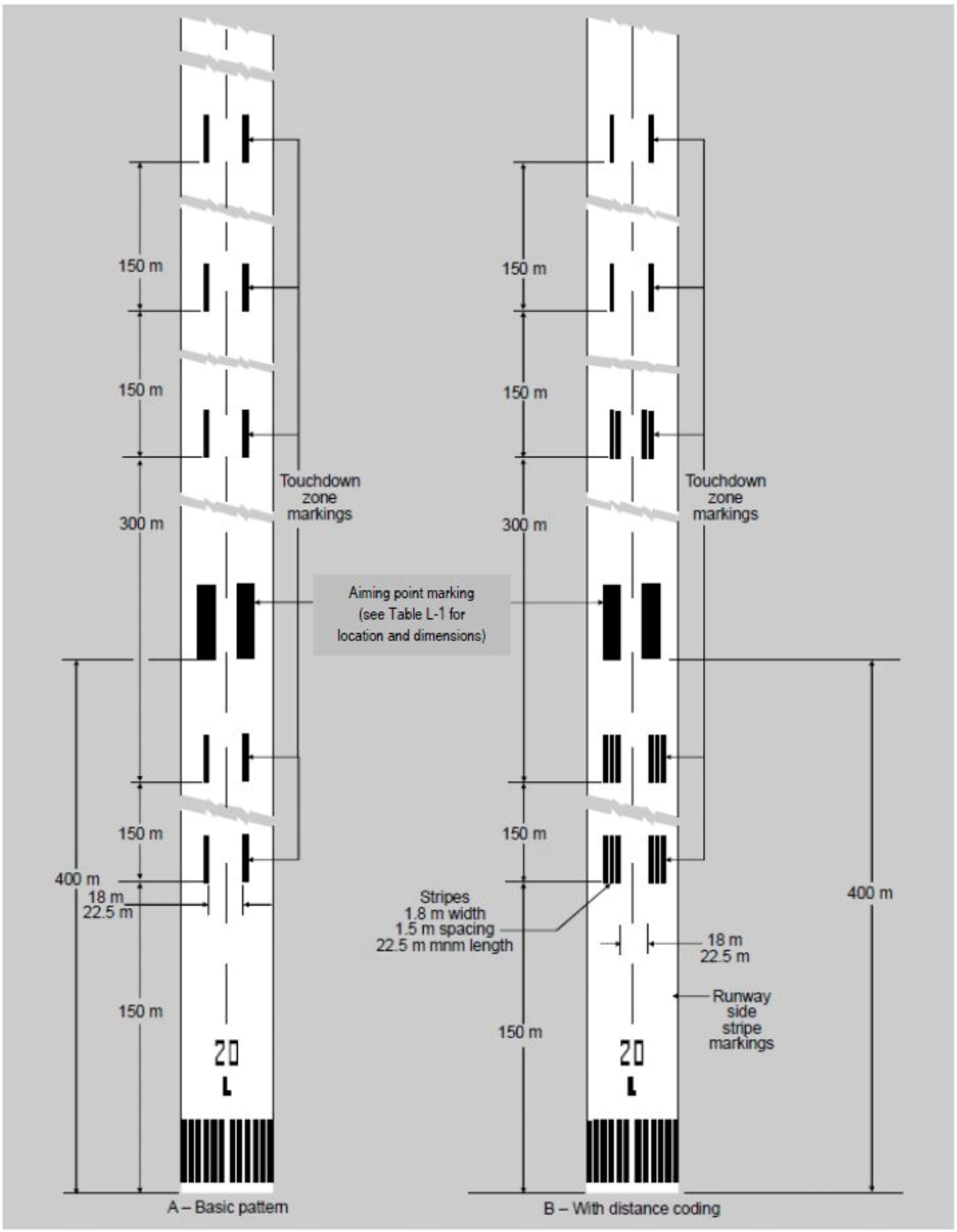


Figure CS-58: Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400 m or more)

GM1 ADR-DSN.L.545 Touchdown zone marking

(a) In order to give information regarding the overall extension of a distance coding touchdown marking, as specified in CS ADR-DSN.L.545, the last pair of markings after the threshold should

consist of two single stripes, and the other pairs should correspond to the patterns shown in Figure L-4.

(b) Such sequential layout gives intuitive information about the extension of the touchdown zone and, as a consequence, of the LDA or of the distance between thresholds.

CS ADR-DSN.L.550 Runway side strip marking

(a) Applicability:

(1) A runway side stripe marking shall be provided on a paved runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain. For unpaved runways, frangible or flush markings may be used.

(2) A runway side stripe marking shall be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

(b) Location and characteristics:

(1) A runway side stripe marking shall consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes should be located 30 m from the runway centre line.

(2) Where a runway turn pad is provided, the runway side stripe marking shall be continued between the runway and the runway turn pad.

(3) Where a runway starter extension is provided, the runway side stripe shall continue along the edge of the runway starter extension as a dashed line.

(4) Except on a runway starter extension, the runway side stripe shall have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

(5) On a runway starter extension, the runway side strip shall be a dashed line conforming to the dimensions shown in Figure CS-58 and with dimensions described in Table CS-45 .

GM1 ADR-DSN.L.550 Runway side strip marking

When turn pads are not available at the end of a runway for back-track manoeuvres and threshold is displaced, in order to better identify full-strength bearing surface, it may be useful to display specific dashed markings as showed by Figure GM-L-1 and with dimensions described in Table CS-45.

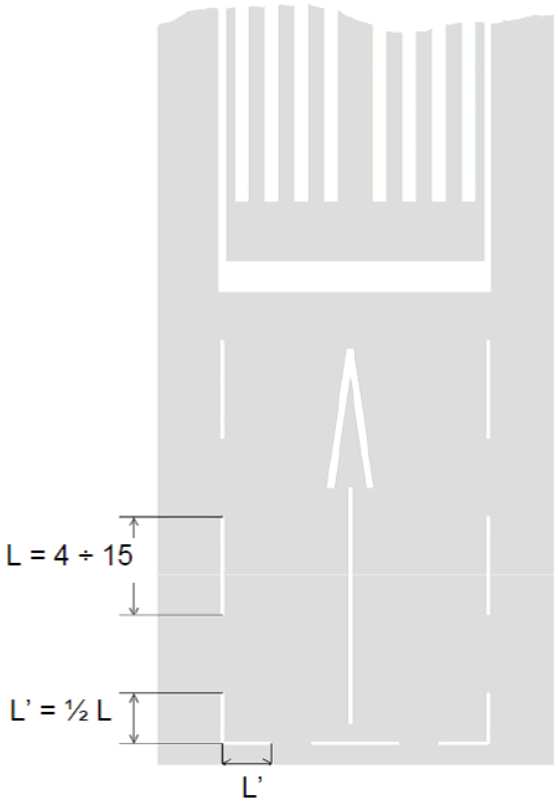


Figure CS-59: Dashed runway side stripe marking

Runway width (m)	Single dash dimensions	
	Length (minimum m)	Width (m)
60	15	0.45
45	15	0.45
30	10	0.45
23	6	0.25
18	4	0.25
Note: The length of the gap is as much as possible equal, but not longer, to the length of the corresponding marking		

Table CS-49: Dashed runway side strip marking

CS ADR-DSN.L.555 Taxiway centre line marking

(a) Applicability:

(1) Taxiway centre line marking shall be provided on a taxiway and apron in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(2) Taxiway centre line marking shall be provided on a runway when the runway is part of a standard taxi-route and there is no runway centre line marking; or where the taxiway centre line is not coincident with the runway centre line.

(b) Characteristics:

(1) On a straight section of a taxiway, the taxiway centre line marking shall be located along the taxiway centre line.

(2) On a taxiway curve, the marking shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

(3) At an intersection of a taxiway with a runway, where the taxiway serves as an exit from the runway, the taxiway centre line marking shall be curved into the runway centre line marking as shown in Figure CS-59. The taxiway centre line marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(4) Where taxiway centre line marking is provided in accordance with (a)(2) above, the marking shall be located on the centre line of the designated taxiway.

(5) A taxiway centre line marking shall be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking as shown in Figure CS-59. Taxiway markings (shown with basic runway markings).

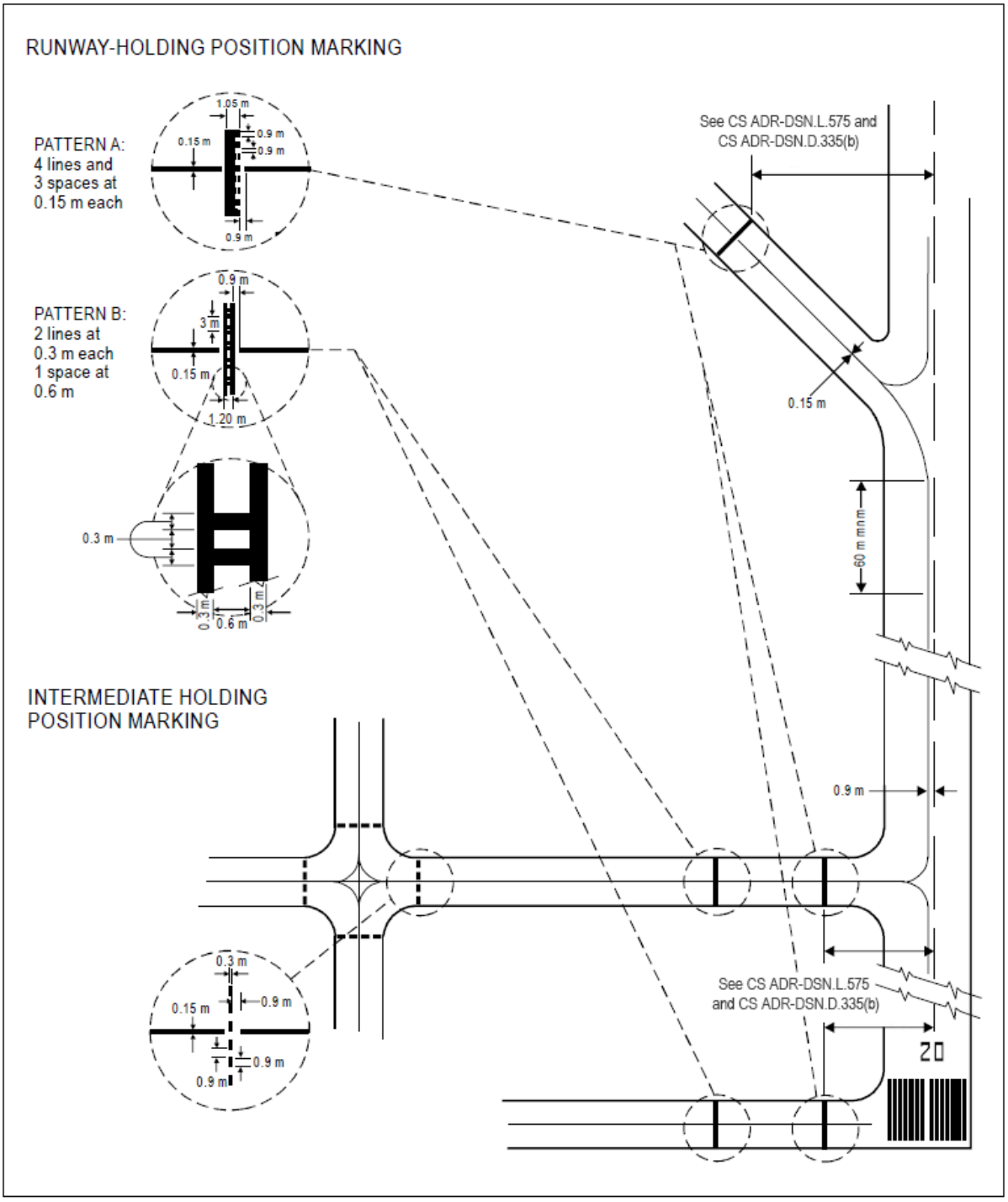


Figure CS-60: Taxiway markings (shown with basic runway markings)

GM1 ADR-DSN.L.555 Taxiway centre line marking

The term 'continuous guidance' is not intended to require that taxiway centre line markings are provided onto aircraft stands. Instead, it is intended that the centre line marking be provided on taxiways leading to aircraft stands or other apron areas from which visual cues or other means exist,

such as lead-in arrows and stand number indicators, to enable aircrew to manoeuvre the aircraft onto a stand or other parking area.

CS ADR-DSN.L.560 Interruption of runway markings

(a) At an intersection of two (or more) runways, the markings of the more important runway, except for the runway side stripe marking, shall be displayed and the markings of the other runway(s) shall be interrupted. The runway side stripe marking of the more important runway may be either continued across the intersection or interrupted.

(b) The order of importance of runways for the display of runway markings should be as follows:

(1) 1st - precision approach runway;

(2) 2nd - non-precision approach runway; and

(3) 3rd - non-instrument runway.

(c) At an intersection of a runway and taxiway the markings of the runway shall be displayed and the markings of the taxiway interrupted, except that runway side stripe markings may be either continued across the intersection or interrupted.

GM1 ADR-DSN.L.560 Interruption of runway markings

(a) At an intersection of a runway and taxiway, the runway side stripe marking should be either continued across the intersection or interrupted. The interruption means one of the following:

(1) the runway side stripe marking stops at the point where the taxiway fillet starts at either side of the taxiway (see Figure CS-60(A)); or

(2) the runway side stripe marking stops at the point where the extended line of the taxiway edge crosses the runway (see Figure CS-60(B)); or

(3) the runway side stripe marking stops at a short distance on either side of the taxiway centre line marking in order to allow visible and continuous taxiway centre line marking guidance (see Figure CS-60(C)); or

(4) the taxiway centre line marking overlays and therefore interrupts a continuous runway side stripe marking (see Figure CS-60(D)).

(b) The overall perception of the runway side stripe marking depends on conspicuity needs and local conditions, such as the number, location and disposition of runway/taxiway intersections,

nature of the surrounding terrain, operational needs at aerodrome, weather, etc.

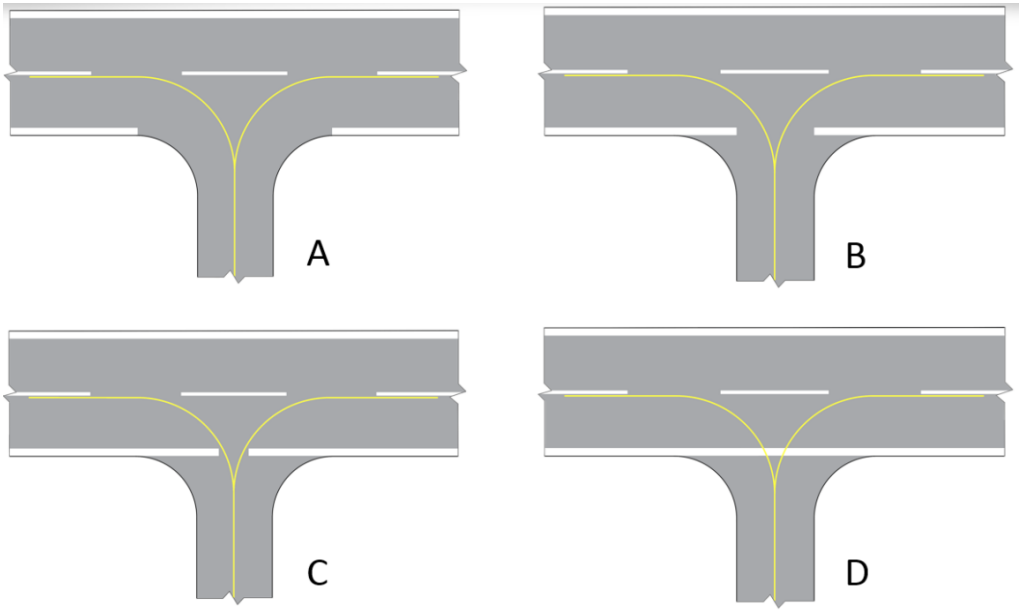


Figure CS-61: Illustration of runway side stripe marking interruption

CS ADR-DSN.L.565 Runway turn pad marking

(a) Applicability: Where a runway turn pad is provided, a runway turn pad marking shall be provided for continuous guidance to enable an aircraft to complete a 180-degree turn and align with the runway centre line.

(b) Characteristics:

(1) The runway turn pad marking shall be curved from the runway centre line into the turn pad. The radius of the curve shall be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the runway turn pad is intended.

(2) The intersection angle of the runway turn pad marking with the runway centre line shall not be greater than 30 degrees.

(3) The runway turn pad marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(4) A runway turn pad marking shall guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made. The straight

portion of the runway turn pad marking shall be parallel to the outer edge of the runway turn pad.

(5) The design of the curve allowing the aeroplane to negotiate a 180-degree turn shall be based on a nose wheel steering angle not exceeding 45 degrees.

(6) The design of the turn pad marking shall be such that when the cockpit of the aeroplane remains over the runway turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the runway turn pad shall be not less than those specified in CS ADR-DSN.B.095(c).

(7) A runway turn pad marking shall be at least 15 cm in width and continuous in length.

GM1 ADR-DSN.L.565 Runway turn pad marking

a) For ease of manoeuvring, consideration should be given to providing a larger wheel-to-edge clearance for aircraft code E and greater.

b) Where a runway turn pad is not provided, a marking for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway centre line may be provided. Such marking should be yellow, at least 15 cm in width and continuous in length.

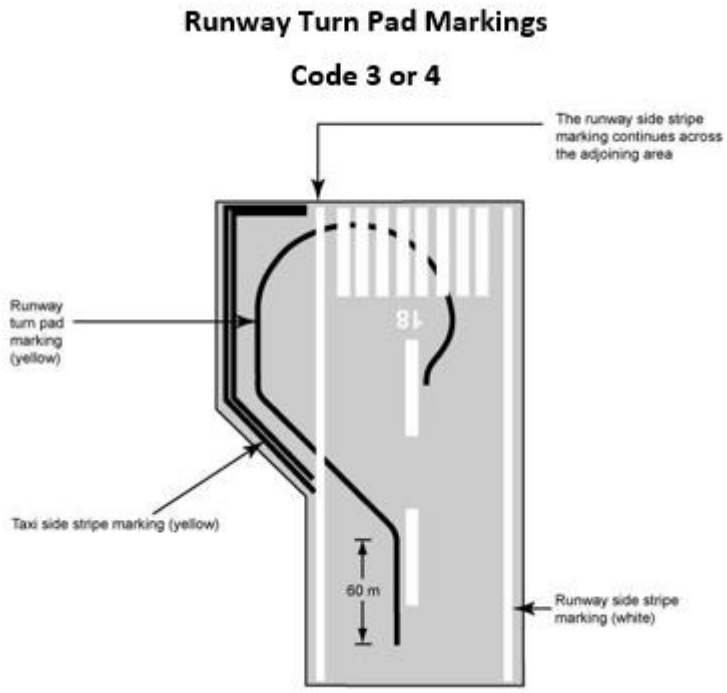


Figure CS-62: Runway turn pad marking (not to scale)

CS ADR-DSN.L.570 Enhanced taxiway centre line marking

a) Where provided, an enhanced taxiway centre line marking shall be installed at each taxiway/runway intersection where it is necessary to denote the proximity of a runway-holding position.

b) Characteristics:

(1) Enhanced taxiway centre line marking shall be as shown in Figure CS-62. An enhanced taxiway centre line marking shall extend from the runway-holding position Pattern A (as defined in Figure CS-59) to a distance of up to 47 m in the direction of travel away from the runway (see Figure CS-62(a)).

(2) If the enhanced taxiway centre line marking intersects another runway-holding position marking, such as for a precision approach Category II or III runway, that is located within 47 m of the first runway-holding position marking, the enhanced taxiway centre line marking shall be interrupted 0.9 m prior to and after the intersected runway-holding position marking. The enhanced taxiway centre line marking shall continue beyond the intersected runway-holding position marking for at least three dashed line segments or 47 m from start to finish, whichever is greater (see Figure CS-62(b)).

(3) If the enhanced taxiway centre line marking continues through a taxiway/taxiway intersection that is located within 47 m of the runway-holding position marking, the enhanced taxiway centre line marking shall be interrupted 1.5 m prior to and after the point where the intersected taxiway centre line crosses the enhanced taxiway centre line. The enhanced taxiway centre line marking shall continue beyond the taxiway/taxiway intersection for at least three dashed line segments or 47 m from start to finish, whichever is greater (see Figure CS-62(c)).

(4) Where two taxiway centre lines converge at or before the runway-holding position marking, the inner dashed line shall not be less than 3 m in length (see Figure CS-62(d)).

Where there are two opposing runway-holding position markings and the distance between the markings is less than 94 m, the enhanced taxiway centre line markings shall extend over this entire distance. The enhanced taxiway centre line markings shall not extend beyond either runway-holding position marking (see Figure CS-62(e)).

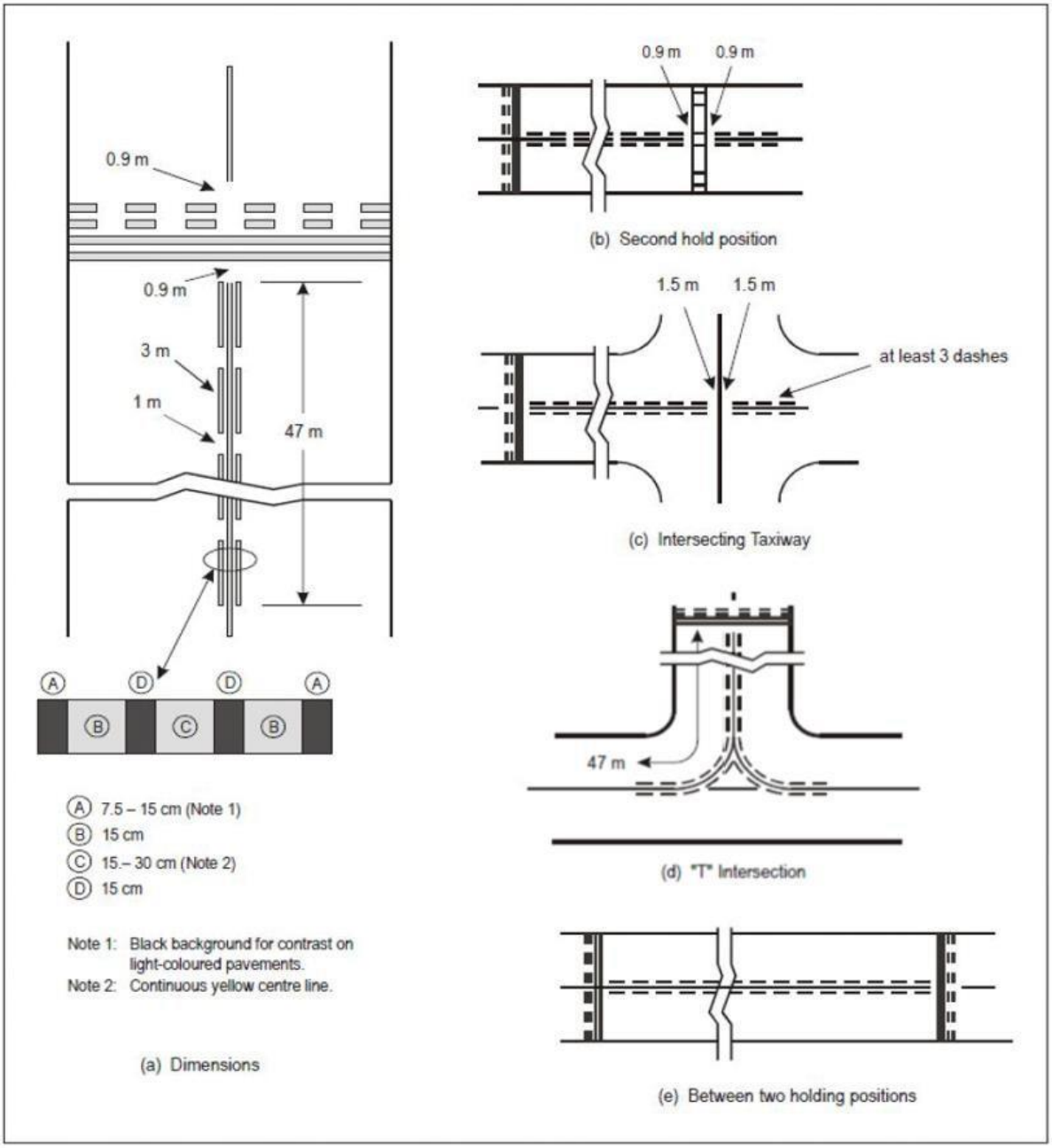


Figure CS-63: Enhanced taxiway centre line marking

GM1 ADR-DSN.L.570 Enhanced taxiway centre line marking

The provision of enhanced taxiway centre line marking may form part of runway incursion prevention measures.

CS ADR-DSN.L.575 Runway-holding position marking

(a) A runway-holding position marking shall be displayed along a runway-holding position.

(b) Characteristics:

(1) At an intersection of a taxiway and a non-instrument, non-precision approach or take-off runway, the runway-holding position marking shall be as shown in Figure CS-63 pattern A.

(2) Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach Category I, II or III runway, the runway-holding position marking shall be as shown in Figure CS-59, pattern A.

(3) Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway shall be as shown in Figure CS-59, pattern A, and the markings farther from the runway should be as shown in Figure CS-59, pattern B.

(4) Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, a mandatory instruction marking containing the term 'CAT II' or 'CAT III' as appropriate should be marked on the surface at the ends of the runway-holding position marking and at equal intervals of 45 m maximum between successive marks. The letters should be not less than 1.8 m high and shall be placed not more than0.9 m on the holding side of the runway holding position marking.

(5) The runway-holding position marking displayed at a runway/runway intersection shall be perpendicular to the centre line of the runway forming part of the standard taxi-route. The pattern of the marking shall be as shown in Figure CS-63, pattern A.

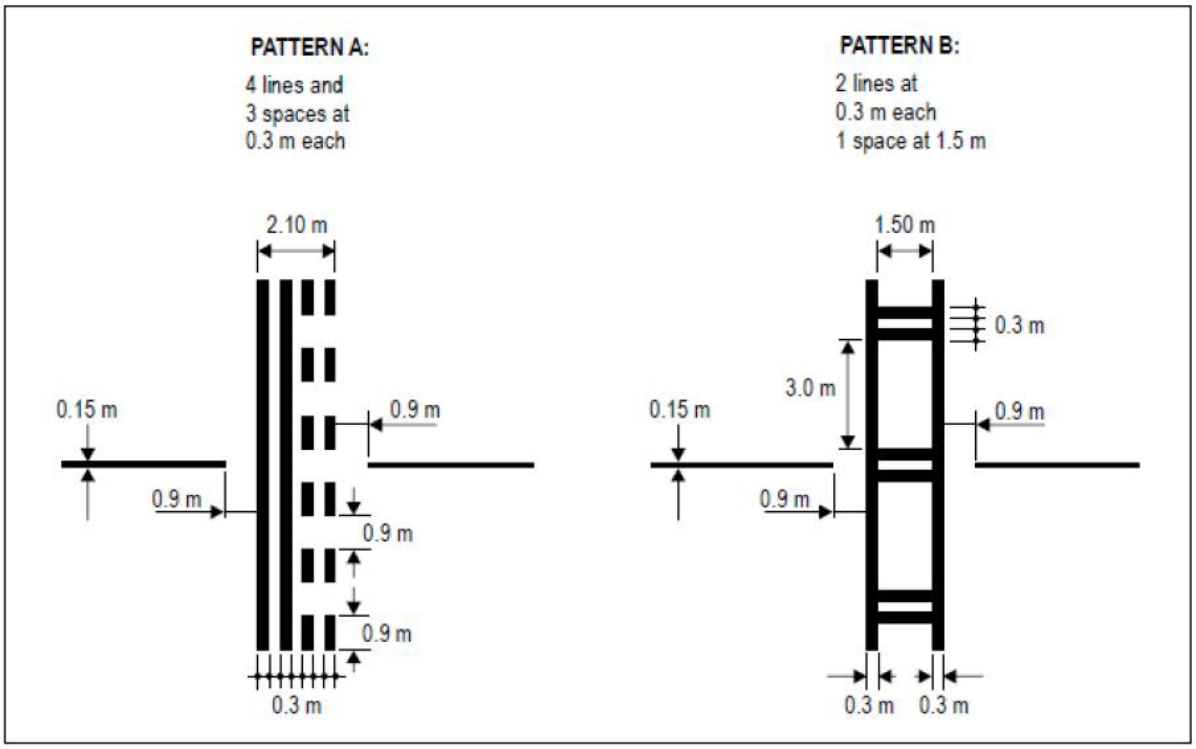


Figure CS-64: Runway-holding position markings

GM1 ADR-DSN.L.575 Runway-holding position marking

When the Runway-holding position marking is supplemented with the term 'CAT II' or 'CAT III' on the areas or taxiways exceeding 60 m in accordance with CS ADR-DSN.L.575(a)(6) and should be placed along with the Mandatory instruction marking in accordance with CS ADR-DSN.L.605 both markings should be equally and symmetrically placed one next to another.

CS ADR-DSN.L.580 Intermediate holding position marking

(a) An intermediate holding position marking shall be displayed along an intermediate holding position.

(b) An Intermediate Holding Position marking shall be displayed at the exit boundary of a remote holding facility adjoining a taxiway.

(c) Location

(1) Where an intermediate holding position marking is displayed at an intersection of two taxiways, it shall be located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft. It shall be coincident with a stop bar or intermediate holding position lights where provided.

(2) The distance between an intermediate holding position marking at the exit boundary of a remote holding facility and the centre line of the adjoining taxiway shall not be less than the dimension specified in the table below.

Code letter	Distance (m)
A	15.5
B	20
C	26
D	37
E	43.5
F	51

Table CS-50: Intermediate holding position separation distances from remote holding positions or from the adjoining taxiway.

(d) Characteristics: An intermediate holding position marking shall consist of a single broken line as shown in Figure CS-59.

CS ADR-DSN.L.585 VOR aerodrome checkpoint marking

(a) Applicability: When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

(b) Location: A VOR aerodrome check-point marking shall be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal.

(c) Characteristics:

(1) A VOR aerodrome check-point marking shall consist of a circle 6 m in diameter and have a line width of 15 cm (see Figure CS-64(A)).

(2) When it is preferable for an aircraft to be aligned in a specific direction, a line should be provided that passes through the centre of the circle on the desired azimuth. The line should extend 6 m outside the circle in the desired direction of heading and terminate in an arrowhead. The width of the line should be 15 cm (see Figure CS-64(B)).

(3) A VOR aerodrome check-point marking, shall be white in colour.

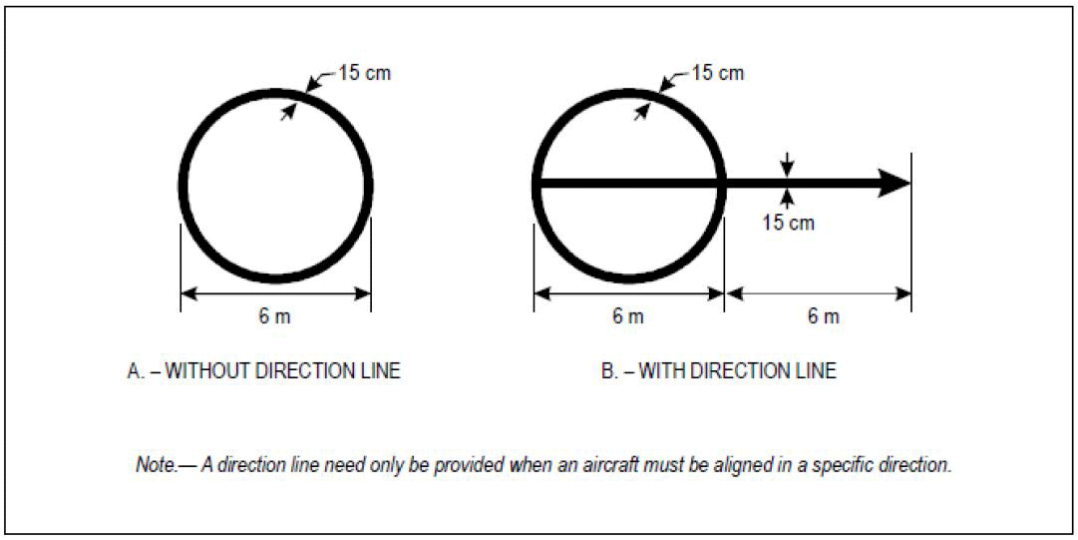


Figure CS-65: VOR check-point markings

GM1 ADR-DSN.L.585 VOR aerodrome checkpoint marking

Further guidance on the selection of sites for VOR aerodrome checkpoints is given in ICAO Annex 10, Volume I, Attachment E.

CS ADR-DSN.L.590 Aircraft stand marking

(a) Applicability: Aircraft stand markings shall be provided for designated parking positions on a paved apron.

(b) General characteristics: Aircraft stand markings shall include such minimum elements as stand identification, lead-in line, stop line and lead-out line as are required by the parking configuration. Aircraft stand markings may also include such elements as a turn bar, turning line, alignment bar and to complement other parking aids.

(c) Aircraft stand markings on a paved apron shall be located so as to provide the clearances specified in CS ADR-DSN.E.365 when the nose wheel follows the stand marking.

(d) Aircraft stand identification:

(1) An aircraft stand identification (letter and/or number) shall be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification shall

be adequate to be readable from the cockpit of aircraft using the stand.

(2) Where two sets of aircraft stand markings are superimposed on each other in order to permit more flexible use of the apron and it is difficult to identify which stand marking should be followed, or safety would be impaired if the wrong marking was followed, then identification of the aircraft for which each set of markings is intended shall be added to the stand identification.

(e) Lead-in, turning, and lead-out lines:

(1) Lead-in, turning, and lead-out lines shall, be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines shall be continuous for the most demanding aircraft and broken for other aircraft.

(2) The curved portions of lead-in, turning, and lead-out lines shall have radii appropriate to the most demanding aircraft type for which the markings are intended.

(3) Where it is intended that an aircraft proceeds in one direction only, arrows pointing in the direction to be followed shall be added as part of the lead-in and lead-out lines.

(f) Alignment bar: An alignment bar where provided shall be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It shall have a width of not less than 15 cm.

(g) Turn bar and stop line:

(1) A turn bar where provided, shall be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It shall have a length and width of not less than 6 m and 15 cm respectively, and include an arrowhead to indicate the direction of turn.

(2) A stop line shall be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It should have a length and width of not less than 6 m and 15 cm respectively.

(3) If more than one turn bar and/or stop line is required, they shall be designated for the appropriate aircraft types.

GM1 ADR-DSN.L.590 Aircraft stand marking

(a) The distances to be maintained between the stop line, turn bar and the lead-in line may vary according to different aircraft types, taking into account the pilot's field of view.

(b) Apron markings are installed to support the safe operation of aircraft on stands and apron areas. Where appropriate procedures are employed, markings may not be required, giving flexibility of operations. Examples would include situations where aircraft marshallers are used or where aircraft are required to self-park on an open apron where different combinations of aircraft preclude dedicated markings. Specific markings/stands are normally more applicable for larger aircraft.

CS ADR-DSN.L.595 Apron safety lines

(a) Applicability: Apron safety lines should be provided on a paved apron as required by the parking configurations and ground facilities.

(b) Location: Apron safety lines shall be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment , etc, to provide safe separation from aircraft.

(c) Characteristics:

(1) Apron safety lines should include such elements as wing tip clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

(2) An apron safety line shall be continuous in length and at least 10 cm in width and shall be of a different colour to differentiate them from the guide lines used for aircraft

(3) Double white lines (Vehicle Limit Lines) shall delineate the vehicle limit line on the apron – beyond which clearance from the Air Traffic Services Unit is required unless otherwise stated. The double white shall be of 10cm wide with a spacing of 10cm. Where a service road is also the limit of vehicle activity on an apron , the edge line of the service road indicating the limit of operations shall be a double white line.

(4) Where a service road is also the limit of vehicle activity on an apron , the edge line of the service road indicating the limit of operations shall be a double white line and is used normally where the apron/taxiway/taxilane boundary is coincident.

(5) Apron safety lines shall be provided on 3 sides of the stand where a double white line is provided at the rear, except when there is a rear of stand GSE road. Where a rear of stand

GSE road exists, a rear Apron safety line (200mm width) can be used between the rear of stand and the road.

(6) A stand safety line and a vehicle limit line(double white line) should not be collocated.

GM1 ADR-DSN.L.595 Apron safety lines

(a) Ground equipment and vehicles should be kept outside predetermined limits when aircraft are manoeuvring or when the equipment is left unattended.

(b) Safety lines are required on an apron to mark the limits of parking areas for ground equipment, apron service roads and passengers' paths, etc. These lines are narrower and of a different colour to differentiate them from the guidelines used for aircraft.

(1) Wing tip clearance lines. These lines should delineate the safety zone clear of the path of the critical aeroplane wing tip. The line should be drawn at appropriate distance outside the normal path of the wing tip of the critical aeroplane;

(2) Equipment limit lines. These lines are used to indicate the limits of areas which are intended for parking vehicles and aircraft servicing equipment when they are not in use.

(c) Several methods may be used to identify which side of a safety line is safe for storage of such vehicles and equipment:

(1) Spurs or an additional line (a discontinuous line of the same colour or a continuous line of a different conspicuous colour) may be provided on one side of the safety line. The side on which such spurs or an additional line is located is considered safe for parking vehicles and equipment;

(2) The words 'Equipment Limit' may be painted on the side used by ground equipment and readable from that side;

(3) Passenger path lines. These lines are used to indicate to passengers and escorting personnel the route that needs to be followed, when walking on the apron, in order to be clear of hazards. A pair of lines with zebra hatching between them may be used.

CS ADR-DSN.L.597 Apron service road marking

(a) Applicability: The limits of an apron service road, shall be defined by apron service road markings.

(b) Location: Apron service road markings shall define the areas intended for use by ground vehicles and other aircraft servicing equipment to provide safe separation from aircraft.

(c) Characteristics:

(1) Apron service road markings shall be white.

(2) Apron service road markings shall be continuous in length on the edges, continuous or broken in the middle, as appropriate, and at least 10 cm in width.

(3) When an apron service road crosses a taxiway or aircraft stand taxilane, the apron service road edge marking shall be laterally dashed along the crossing. The stripes shall be 1.0 m in length, and their width shall be equal to the width of the continuous part of the marking.

(d) Apron service road markings shall be discontinued when they intersect with other markings on an apron. The interrupted gap shall be not more than 1 m on each side from the edge of the intersected marking.

GM1 ADR-DSN.L.597 Apron service road marking

(a) The term service road encompasses also other types of roads, such as the perimeter service roads, which are used to provide access to security or maintenance services etc. of the aerodrome. However, such types of service roads do not fall under the term 'apron service road'.

(b) When an apron service road crosses a taxiway, a separate road-holding position sign, in accordance with CS ADR-DSN.N.800, or road-holding position marking, in accordance with CS ADR-DSN.L.600, should indicate that vehicles are required to stop.

(c) Markings located on an apron are prescribed in CS ADR-DSN.L.555, CS ADR-DSN.L.590 and CS ADR-DSN.L.595.

CS ADR-DSN.L.600 Road-holding position marking

(a) Applicability: A road-holding position marking shall be provided at all road entrances or intersections to a runway or a taxiway.

(b) Location:

(1) The road-holding position marking shall be located across the road at the holding position to provide clearance from aircraft or protection to navigation aids. .

(2) Where a road intersects a taxiway, a road-holding position marking shall be located across the road at the appropriate distance to ensure vehicles remain clear of the taxiway strip.

(c) Characteristics:

(1) The road-holding position marking should be displayed as double white lines or be in accordance with the local road traffic regulations.

GM1 ADR-DSN.L.600 Road-holding position marking

(a) Where a road that accesses a runway or a taxiway is unpaved, it may not be possible to install markings. In such cases, a road-holding position signs and/or lights should be installed, combined with appropriate instructions on how the driver of a vehicle should proceed.

(b) Where it is possible to install markings, they should conform to national regulations for traffic sings and markings.

CS ADR-DSN.L.605 Mandatory instruction markings

(a) Applicability:

(1) Where it is impracticable to install a mandatory instruction sign in accordance with CS ADR-DSN.N.780 , mandatory instruction marking shall be provided on the surface of the pavement;

(2) Where operationally required on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign shall be supplemented by a mandatory instruction marking.

(b) Location:

(1) The mandatory instruction marking on taxiways, where the code letter is A, B, C, or D, shall be located across the taxiway equally placed about the taxiway centre line and on the holding side of the runway-holding position marking as shown in Figure CS-65(A). The distance between the nearest edge of the marking and the runway-holding position marking or the taxiway centre line marking shall be not less than 1 m.

(2) The mandatory instruction marking on taxiways where the code letter is E or F, shall be located on the both sides of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure CS-65(B) or at the intermediate

holding position marking as applicable. The distance between the nearest edge of the marking and the runway-holding position marking, or the taxiway centre line marking shall be not less than 1 m.

(3) Except where operationally required and approved by the GCAA, a mandatory instruction marking shall not be located on a runway.

(c) Characteristics:

(1) A mandatory instruction marking shall consist of an inscription in white on a red background. Except for a no-entry marking, the inscription shall provide information identical to that of the associated mandatory instruction sign.

(2) A no-entry marking shall consist of an inscription in white reading NO ENTRY on a red background.

(3) Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking shall include an appropriate border, preferably white or black.

(4) The character height shall be 4 m for inscriptions where the code letter is C, D, E, or F, and at least 2 m where the code letter is A or B. The inscription should be in the form and proportions shown in Figures CS-67A,CS-68B,CS-69C,CS-70D.

(5) The background shall be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

GM1 CS ADR-DSN.L.605 Mandatory instruction markings

(a) The spacing of characters for mandatory instruction marking should be obtained by first determining the equivalent elevated sign character height and then proportioning from the spacing values given in Table CS-59.

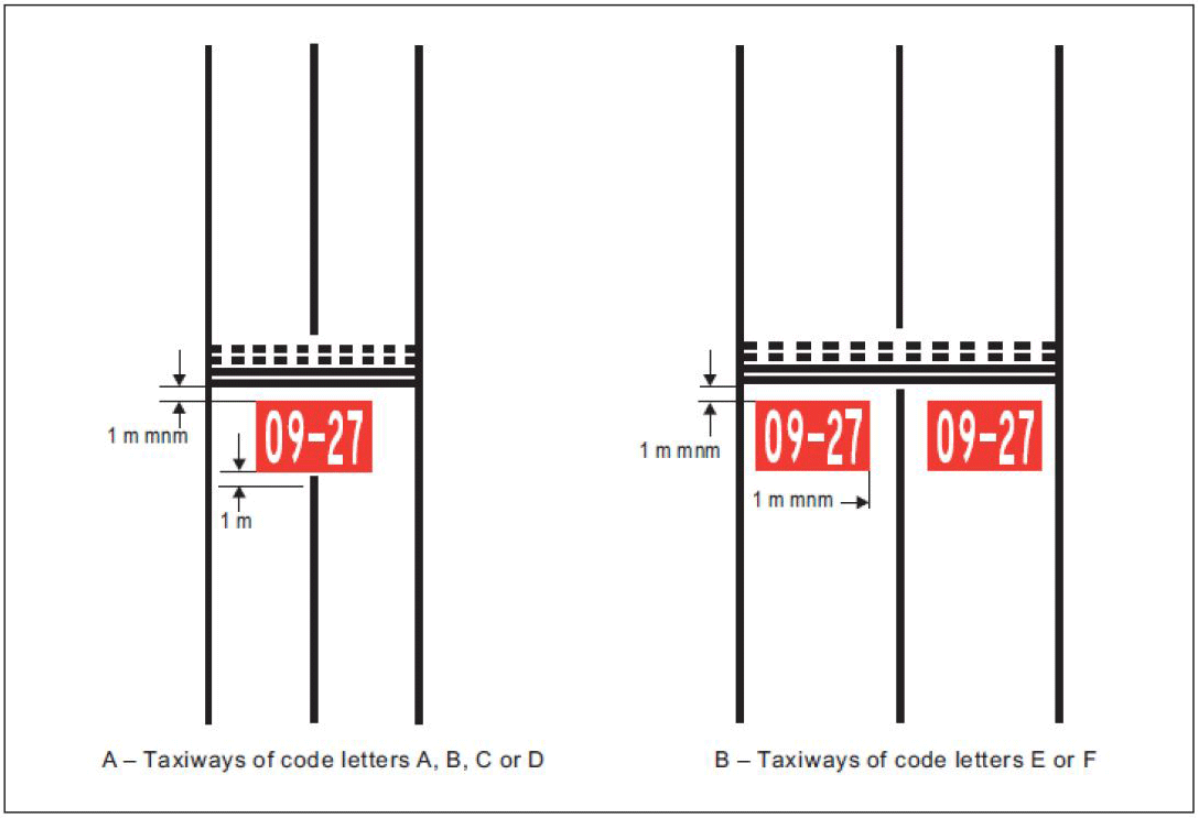


Figure CS-66: Mandatory instruction marking

GM2 ADR-DSN.L.605 Mandatory instruction marking

(a) The mandatory instruction markings and information markings on pavements are formed as if shadowed (i.e. stretched) from the characters of an equivalent elevated sign by a factor of 2.5, as illustrated in Figure CS-66. The shadowing only affects the vertical dimension. Therefore, the spacing of characters for pavement marking is obtained by first determining the equivalent elevated sign character height and then proportioning from the spacing values given in Table CS-59.

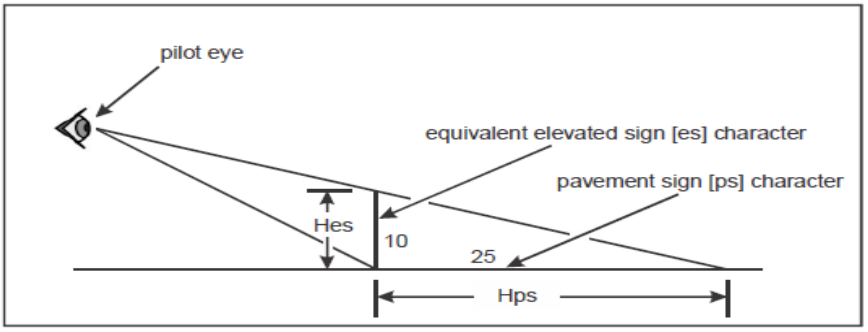


Figure CS-67: Illustration of pavement marking spacing calculation

(b) The example illustrates how the pavement marking spacing is to be calculated:

(1) in the case of runway designator '10', which is to have a height of 4 000 mm (Hps), the equivalent elevated sign character height is 4 000/2.5 = 1 600 mm (Hes);

(2) Table CS-59(b) indicates numeral to numeral code 1 and from Table CS-59(c) this code has a dimension of 96 mm, for a character height of 400 mm;

(3) the pavement marking spacing for '10' is then (1 600/400) x 96 = 384 mm.

(4) Guidance on mandatory instruction marking is given in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.L.610 Information marking

(a) Where an information sign would normally be installed and it is impractical to install, as acceptable to the GCAA, an information marking shall be displayed on the surface of the pavement.

(b) Where operationally required an information sign should be supplemented by an information marking.

(c) An information (location/direction) marking shall, be displayed on the pavement surface at regular intervals along taxiways of great length when required by the GCAA.

(d) Location:

(1) An information (location/direction) marking should preferably be displayed prior to and following complex taxiway intersections, and where operational experience has indicated the addition of a taxiway location marking could assist flight crew ground navigation.

(2) The information marking shall be displayed across the surface of the taxiway or apron where necessary, and positioned so as to be legible from the cockpit of an approaching aircraft.

(e) Characteristics:

(1) An information marking shall consist of:

(i) an inscription in yellow upon a black background when it replaces or supplements a location sign; and

(ii) an inscription in black upon a yellow background when it replaces or supplements a

direction or destination sign.

(2) Where there is insufficient contrast between the marking background and the pavement surface, the marking shall include:

(i) a black border where the inscriptions are in black; and

(ii) a yellow border where the inscriptions are in yellow.

(3) The character height, spacing, and the form and proportions of the inscription shall be asper the below figure for mandatory instruction markings.

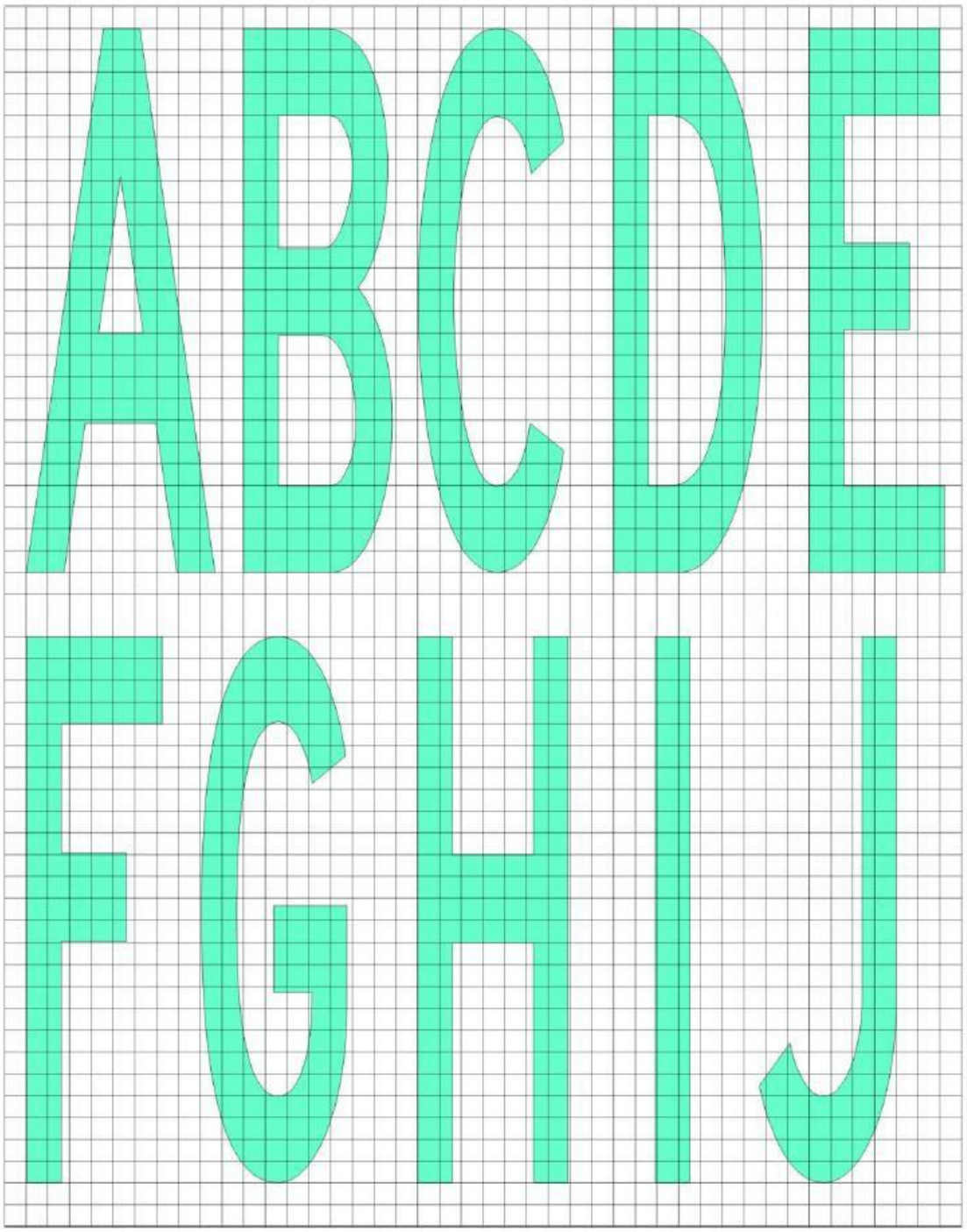


Figure CS-68 A: Mandatory instruction marking inscription form and proportions



Figure CS-69 B: Mandatory instruction marking inscription form and proportions

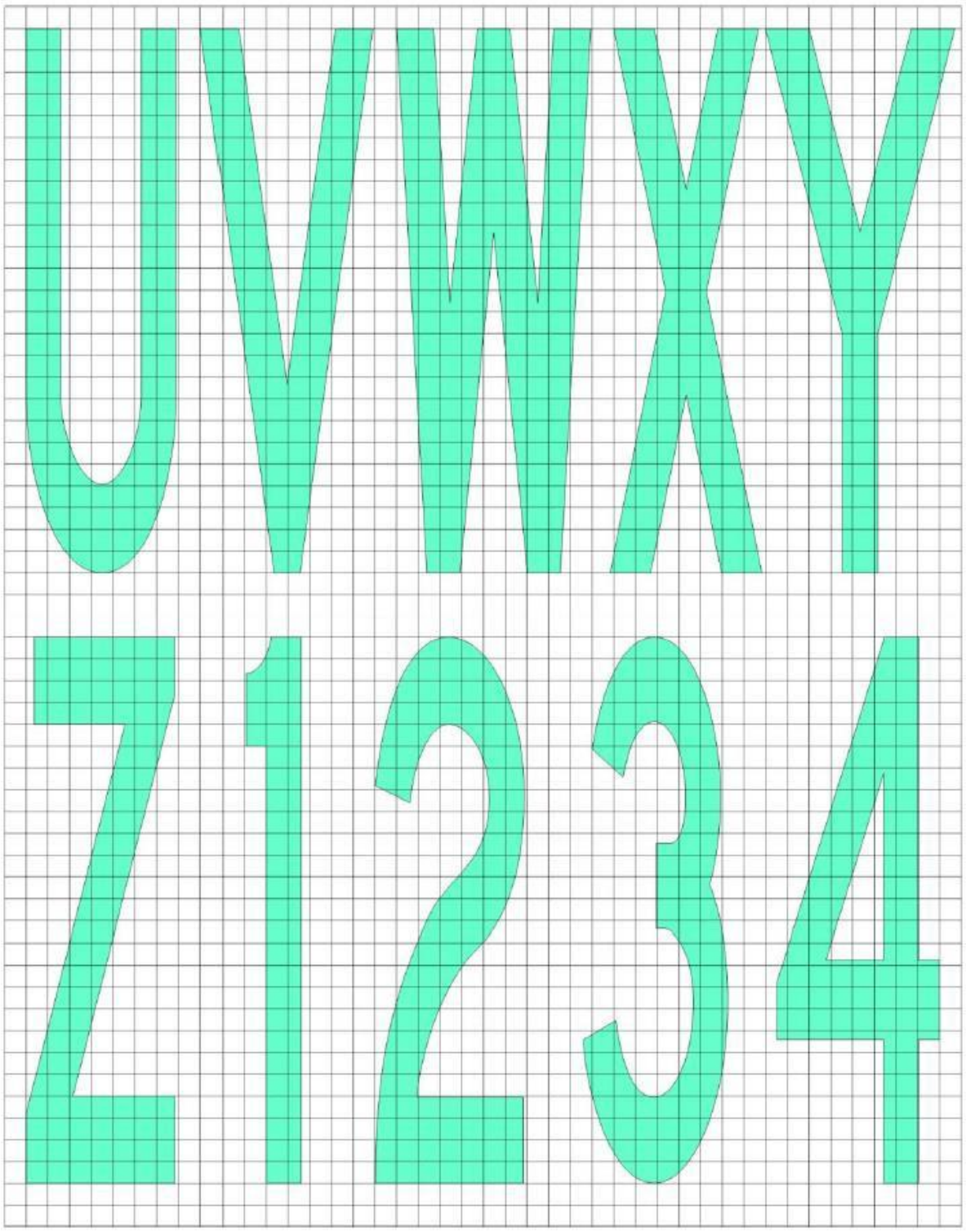


Figure CS-70 C: Mandatory instruction marking inscription form and proportions



Figure CS-71 D: Mandatory instruction marking inscription form and proportions

GM1 ADR-DSN.L.610 Information marking

Guidance on information marking is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

CS ADR-DSN.M.615 General

(a) Non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

(b) Elevated approach lights: Elevated approach lights and their supporting structures shall be frangible except that, in that portion of the approach lighting system beyond 300 m from the threshold:

(1) where the height of a supporting structure exceeds 12 m, the frangibility requirement shall apply to the top 12 m only; and

(2) where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects shall be frangible.

(c) When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it shall be suitably marked.

(d) Elevated lights:

Elevated runway, stopway, and taxiway lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

(e) Surface lights:

(1) Light fixtures inset in the surface of runways, stopways, taxiways, and aprons shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

(2) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tire should not exceed 160°C during a 10-minute period of exposure.

(f) Light intensity and control:

(1) The intensity of runway lighting shall be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

(2) Where a high-intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods shall be provided to ensure that the following systems when installed, can be operated at compatible intensities:

(i) approach lighting system;

(ii) runway edge lights;

(iii) runway threshold lights;

(iv) runway end lights;

(v) runway centre line lights;

(vi) runway touchdown zone lights; and

(vii) taxiway centre line lights.

(g) On the perimeter of and within the ellipse defining the main beam in CS ADR-DSN.U.940, the maximum light intensity value shall not be greater than three times the minimum light intensity value measured in accordance with CS ADR-DSN.U.940.

GM1 ADR-DSN.M.615 General

(a) Aeronautical ground lights near navigable waters should be taken into consideration to ensure that the lights do not cause confusion to mariners.

(b) In dusk or poor visibility conditions by day, lighting can be more effective than marking. For lights to be effective in such conditions or in poor visibility by night, they should be of adequate intensity. To obtain the required intensity, it should usually be necessary to make the light directional, in which case the arcs over which the light shows should be adequate and so orientated as to meet the operational requirements. The runway lighting system should be considered as a whole, to ensure that the relative light intensities are suitably matched to the same end.

(c) While the lights of an approach lighting system may be of higher intensity than the runway lighting, it is good practice to avoid abrupt changes in intensity as these could give a pilot a false

impression that the visibility is changing during approach.

(d) The conspicuity of a light depends on the impression received of contrast between the light and its background. If a light is to be useful to a pilot by day when on approach, it should have an intensity of at least 2 000 or 3 000 cd, and in the case of approach lights an intensity of the order of 20 000 cd is desirable. In conditions of very bright daylight fog it may not be possible to provide lights of sufficient intensity to be effective.

(e) On the other hand, in clear weather on a dark night, an intensity of the order of 100 cd for approach lights and 50 cd for the runway edge lights may be found suitable. Even then, owing to the closer range at which they are viewed, pilots have sometimes complained that the runway edge lights seemed unduly bright.

(f) In fog the amount of light scattered is high. At night this scattered light increases the brightness of the fog over the approach area and runway to the extent that little increase in the visual range of the lights can be obtained by increasing their intensity beyond 2 000 or 3 000 cd. In an endeavor to increase the range at which lights would first be sighted at night, their intensity should not be raised to an extent that a pilot might find excessively dazzling at diminished range.

(g) From the foregoing should be evident the importance of adjusting the intensity of the lights of an aerodrome lighting system according to the prevailing conditions, so as to obtain the best results without excessive dazzle that would disconcert the pilot. The appropriate intensity setting on any particular occasion should depend both on the conditions of background brightness and the visibility.

(h) Assessment on dazzle in the aerodrome vicinity:

(1) Human vision is a complex mechanism using both eye and brain. Even though this mechanism is quite handled for eye, there is still a lack of knowledge on the interpretation of it by the brain. Thus, vision varies from one human being to another.

(2) The field of view is defined by the area perceived by eyes. The perception of details is based on the luminance ratio between elements of the scene, taking into account spatial distribution. Luminance and contrast are key elements of vision mechanism.

(3) Four sectors can be identified in the field of view (FOV):

(i) sensation field, corresponding to the absolute boundaries of FOV; it opens up to

approximately 90° on each side of the eye direction;

(ii) visibility field, which is narrower and enables the perception of an object; it opens up to 60°;

(iii) conspicuity field, which enables the recognition, it opens up to 30°;

(iv) working conspicuity field, which is further tightly centred on the eye direction (1° to 2°); it enables the identification and is the working area of the vision.

It is reminded that the retina is composed in its centre by cone cells (that see colours and details) and at the periphery by rod cells (that perceive movements and change of state).

(i) A safety assessment is conducted in order to identify situations where the risk of dazzling becomes unacceptable. Thus, it is noted that dazzle represents such a risk in the following situations:

(1) during approach, especially after the aircraft has descended below the decision height: the pilot should not lose any visual cue;

(2) at touchdown the pilot should not be surprised by a flash;

(3) during rolling (landing or take-off), the pilot should be able to perceive his environment and detect any deviation from the centre line: the pilot should not lose any visual cue.

(4) Thus:

(i) prejudicial dazzle due to veiling luminance should not occur during approach (slightly before the decision height) and rolling; and

(ii) surprise effect should not occur at touchdown.

(j) Regarding air traffic controllers, it has been considered that dazzle induced by veiling effect should not reduce the visual perception of aircraft operations on, and close to the runway.

(k) The elements here above can be applied to solar panels. The following assumptions can be made:

(1) solar panels are inclined so as to efficiently capture the sunlight, conducting to a range of cross section surfaces;

(2) the maximum acceptable luminance value has been fixed to 20 000 cd/m^2; and

(3) the surfaces varied from 100 m^2 to several hectares.

(l) It is assumed that the aircraft maintains precisely its trajectory whereas in reality the approach is conducted into a conical envelop around the expected trajectory.

CS ADR-DSN.M.616 Emergency lighting

(a) Applicability: At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights shall be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system.

Note: Emergency lighting may also be useful to mark obstacles or delineate taxiways and apron areas.

(b) Location: When installed on a runway the emergency lights shall, as a minimum, conform to the configuration required for a non-Instrument Runway.

(c) The colour of the emergency lights should conform to the colour requirements for runway lighting, except that, where the provision of coloured lights at the threshold and the runway end is not practicable, all lights may be variable white or as close to variable white as practicable.

CS ADR-DSN.M.620 Aeronautical beacons

(a) General

(1) When operationally necessary an aerodrome beacon or identification beacon shall be provided at each aerodrome intended for use at night.

(2) The operational requirement shall be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings, and the installation of other visual and non-visual aids useful in locating the aerodrome.

(b) Aerodrome beacon

(1) Applicability

(i) An aerodrome beacon shall be provided at an aerodrome intended for use at night if aircraft navigate predominantly by visual means and if one or more of the following conditions exist:

i. reduced visibilities are frequent;

ii. it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

(2) Location

(i) The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting.

(ii) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(3) Characteristics

(i) The aerodrome beacon shall show either coloured flashes alternating with white flashes or white flashes only.

(ii) Where used, the coloured flashes emitted by beacons at land aerodromes shall be green and coloured flashes emitted by beacons at water aerodromes shall be yellow. In the case of a combined water and land aerodrome, coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

(iii) The frequency of total flashes shall be from 20 to 30 per minute.

(iv) The light from the beacon shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used, and the effective intensity of the flash shall be not less than 2 000 cd.

(v) At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash may be required to be increased by a factor up to a value of 10.

(c) Identification beacon

(1) Applicability

An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

(2) Location

(i) The identification beacon shall be located on the aerodrome in an area of low ambient background lighting.

(ii) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(3) Characteristics

(i) An identification beacon at a land aerodrome shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used, and the effective intensity of the flash shall be not less than 2 000 cd.

(ii) An identification beacon shall show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

(iii) The identification characters shall be transmitted in the International Morse Code.

(iv) The speed of transmission should be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

GM1 CS ADR-DSN.M.620 Aeronautical beacons

At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash should be required to be increased by a factor up to a value of 10.

CS ADR-DSN.M.625 Approach lighting systems

(a) The safety objective of the approach lighting system is to provide alignment and roll guidance, and limited distance-to-go information to enable safe approach to a runway.

(b) Non-instrument runway

Applicability: Where physically practicable, a simple approach lighting system as specified in CS ADR-DSN.M.626 should be provided to serve a non-instrument runway where the code number is 3 or 4, and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

A simple approach lighting system can also provide visual guidance by day.

(c) Non-precision approach runway

Applicability: Where physically practicable, a simple approach lighting system specified in CS ADR-DSN.M.626 shall be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

(d) Precision approach runway Category I

Applicability: Where physically practicable, a precision approach Category I lighting system as specified in CS ADR-DSN.M.630 shall be provided to serve a precision approach runway Category I.

(e) Precision approach runway Categories II and III

Applicability: A precision approach Category II and III lighting system as specified in CS ADR-DSN.M.635 shall be provided to serve a precision approach runway Category II or III.

GM1 ADR-DSN.M.625 Approach lighting systems

(a) For ADR-DSN.M.625 (c) It is advisable to give consideration of a Precision Approach Category 1 lighting system or to the addition of a runway lead-in lighting system.

(b) Types and characteristics

(1) The approach lighting patterns that have been generally adopted are shown in Figures CS-71 and CS-77. A diagram of the inner 300 m of the precision approach Category II and III lighting system is shown in Figures CS-75 and CS-76.

(2) The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in CS ADR-DSN.M.615(d)(1).The characteristics of these inset lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-5 or U-6, as appropriate and the chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(3) Examples of flight path envelopes used in designing the lighting are shown in Figure CS-74

(c) Horizontal installation tolerances:

(1) The dimensional tolerances are shown in Figure CS-72and CS-77.

(2) The centre line of an approach lighting system should be as coincident as possible with the extended centre line of the runway with a maximum tolerance of ±15'.

(3) The longitudinal spacing of the centre line lights should be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable, between two crossbars or a crossbar and a threshold.

(4) The crossbars and barrettes should be at right angles to the centre line of the approach lighting system with a tolerance of ±30' if the pattern in Figure CS-77(A) is adopted or ± 2° if Figure CS-77(B) is adopted.

(5) When a crossbar has to be displaced from its standard position, any adjacent crossbar should where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

(6) When a crossbar in the system shown in Figure CS-77(A) is displaced from its standard position, its overall length should be adjusted so that it remains one-twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to

adjust the standard 2.7 m spacing between the crossbar lights but the crossbars should be kept symmetrical about the centre line of the approach lighting.

(d) Vertical installation tolerances:

(1) The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold as shown in Figure CS-72, and this should be the general aim as far as local conditions permit. However, buildings, trees, etc. should not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

(2) Within a stopway or clearway, and within 150 m of the end of a runway, the lights should be mounted as near to the ground as local conditions permit in order to minimise risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond the stopway

and clearway, it is not so necessary for the lights to be mounted close to the ground, and, therefore, undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

(3) It is desirable that the lights be mounted so that as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 350 m from the threshold for a precision approach lighting system, or 900 m for a simple approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

(4) In order to avoid giving a misleading impression of the plane of the ground, the lights should not be mounted below a gradient of 1 in 66 downwards from the threshold to a point 300 m out, and below a gradient of 1 in 40 beyond the 300 m point. For a precision approach Category II and III lighting system, more stringent criteria may be necessary,

e.g. negative slopes not permitted within 450 m of the threshold.

(i) Centre line. The gradients of the centre line in any section (including a stopway or clearway) should be as small as practicable, and the changes in gradients should be as few and small as can be arranged, and should not exceed 1 in 60. Experience has shown that as one proceeds outwards from the runway, rising gradients in any section of up to 1 in 66, and falling gradients of down to 1 in 40, are acceptable.

(ii) Crossbars. The crossbar lights should be so arranged as to lie on a straight line passing through the associated centre line lights, and wherever possible, this line should be horizontal. It is permissible, however, to mount the lights on a transverse gradient not more than 1 in 80 if this enables crossbar lights within a stopway or clearway to be mounted nearer to the ground on sites where there is a cross-fall.

(5) When the barrette is composed of lights approximating to point sources, a spacing of

1.5 m between adjacent lights in the barrette has been found satisfactory.

(6) At locations where identification of the simple approach lighting system is difficult at night due to surrounding lights, sequence flashing lights installed in the outer portion of the system may resolve this problem.

(e) Clearance of obstacles:

(1) An area, hereinafter referred to as the light plane, has been established for obstacle clearance purposes, and all lights of the system are in this plane. This plane is rectangular in shape and symmetrically located about the approach lighting system's centre line. It starts at the threshold and extends 60 m beyond the approach end of the system, and is 120 m wide.

(2) No objects are permitted to exist within the boundaries of the light plane which are higher than the light plane except as designated herein. All roads and highways are considered as obstacles extending 4.8 m above the crown of the road, except aerodrome service roads where all vehicular traffic is under control of the aerodrome operator and coordinated with the aerodrome air traffic control. Railroads, regardless of the amount of traffic, are considered as obstacles extending 5.4 m above the top of the rails.

(3) It is recognised that some components of electronic landing aids systems, such as reflectors, antennas, monitors, etc. should be installed above the light plane. Every effort should be made to relocate such components outside the boundaries of the light plane. In the case of reflectors and monitors, this can be done in many instances.

(4) Where an ILS localiser is installed within the light plane boundaries, it is recognised that the localiser, or screen if used, should extend above the light plane. In such cases, the height of these structures should be held to a minimum and they should be located as far from the threshold as possible. In general, the rule regarding permissible heights is 15 cm for each 30 m the structure is located from the threshold. As an example, if the localiser is located 300 m from the threshold, the screen should be permitted to extend above the plane of the approach lighting system by 10 × 15 = 150 cm maximum but preferably should be kept as low as possible, consistent with proper operation of the ILS.

(5) In locating an MLS azimuth antenna, the guidance contained in ICAO Annex 10, Volume I, Attachment G, should be followed. This material which also provides guidance on collocating an MLS azimuth antenna with an ILS localiser antenna, suggests that the MLS azimuth antenna may be sited within the light plane boundaries where it is not possible or practical to locate it beyond the outer end of the approach lighting for the opposite direction of approach. If the MLS azimuth antenna is located on the extended centre line of the runway, it should be as far as possible from the closest light position to the MLS

azimuth antenna in the direction of the runway end. Furthermore, the MLS azimuth antenna phase centre should be at least 0.3 m above the light centre of the light position closest to the MLS azimuth antenna in the direction of the runway end. (This could be relaxed to 0.15 m if the site is otherwise free of significant multipath problems.)

(6) Compliance with this requirement which is intended to ensure that the MLS signal quality is not affected by the approach lighting system, could result in the partial obstruction of the lighting system by the MLS azimuth antenna. To ensure that the resulting obstruction does not degrade visual guidance beyond an acceptable level, the MLS azimuth antenna should not be located closer to the runway end than 300 m and the preferred location is 25 m beyond the 300 m crossbar (this would place the antenna 5 m behind the light position 330 m from the runway end). Where an MLS azimuth antenna is so located, a central part of the 300 m crossbar of the approach lighting system would alone be partially obstructed. Nevertheless, it is important to ensure that the unobstructed lights of the crossbar remain serviceable all the time.

(7) Objects existing within the boundaries of the light plane, requiring the light plane to be raised in order to meet the criteria contained herein, should be removed, lowered, or relocated where this can be accomplished more economically than raising the light plane.

(8) In some instances, objects may exist which cannot be removed, lowered, or relocated economically. These objects may be located so close to the threshold that they cannot be cleared by the 2 % slope. Where such conditions exist and no alternative is possible, the 2 % slope may be exceeded or a 'stair step' resorted to in order to keep the approach lights above the objects. Such 'step' or increased gradients should be resorted to only when it is impracticable to follow standard slope criteria, and they should be held to the absolute minimum. Under this criterion no negative slope is permitted in the outermost portion of the system.

(f) Consideration of the effects of reduced lengths:

(1) The need for an adequate approach lighting system to support precision approaches where the pilot is required to acquire visual references prior to landing, cannot be stressed too strongly. The safety and regularity of such operations is dependent on this visual acquisition. The height above runway threshold at which the pilot decides there are sufficient visual cues to continue the precision approach and land, should vary,

depending on the type of approach being conducted and other factors such as meteorological conditions, ground and airborne equipment, etc. The required length of approach lighting system which should support all the variations of such approaches is 900 m, and this should always be provided whenever possible.

(2) However, there are some runway locations where it is impossible to provide the 900 m length of approach lighting system to support precision approaches.

(3) In such cases, every effort should be made to provide as much approach lighting system as possible. Restrictions on operations could be imposed on runways equipped with reduced lengths of approach lighting. There are many factors which determine at what height the pilot should have decided to continue the approach to land or execute a missed approach. It should be understood that the pilot does not make an instantaneous judgement upon reaching a specified height. The actual decision to continue the approach and landing sequence is an accumulative process which is only concluded at the specified height. Unless lights are available prior to reaching the decision point, the visual assessment process is impaired and the likelihood of missed approaches should increase substantially. There are many operational considerations which should be taken into account in deciding if any restrictions are necessary to any precision approach and these are detailed in ICAO Annex 6.

(g) For non-precision approach runways, it is advisable to give consideration to the installation of a precision approach Category I lighting system or to the addition of a runway lead-in lighting system.

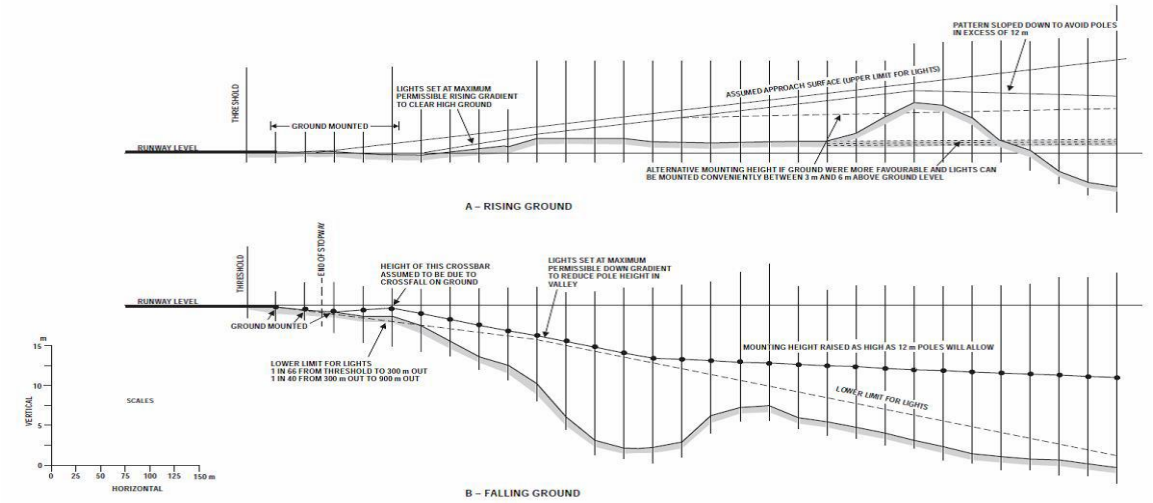


Figure CS-73: Vertical installation tolerances

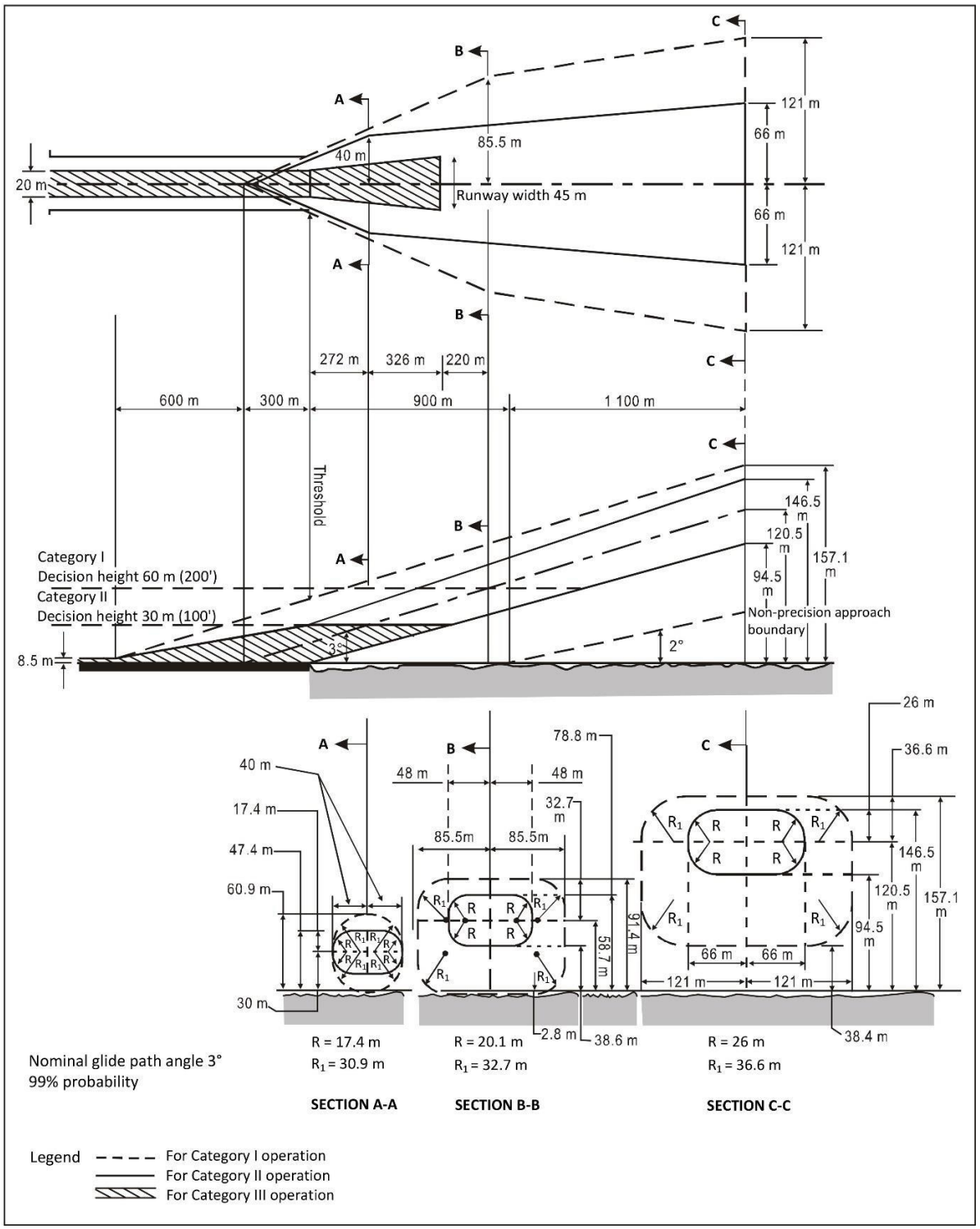


Figure CS-74: Flight path envelope examples for lighting design for Category I, II and III operations — Centre line lights

CS ADR-DSN.M.626 Simple approach lighting systems

(a) Location and composition

A simple approach lighting system shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold.

(b) Crossbar lights:

(1) The lights forming the crossbar shall be as close as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

(2) The lights of the crossbar shall be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements, and each shall not exceed 6 m.

(3) Spacing for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and firefighting vehicles.

(c) Centre line lights:

(1) The lights forming the centre line shall be placed at longitudinal intervals of 60 m, except that when it is desired to improve the guidance, an interval of 30 m may be used.

(2) The innermost light shall be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights.

(3) If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it shall be extended to 300 m so as to include the crossbar. If this is not possible, the centre line lights should be extended as far as practicable, and each centre line light should then consist of a barrette at least 3 m in length. Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold.

(4) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane

of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette, excluding their extremities, shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle, and marked and lighted accordingly as specified in the requirements for obstacle marking and lighting.

(d) Characteristics:

(1) The lights of a simple approach lighting system shall be fixed lights and the colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present. Each centre line light shall consist of either:

(i) a single source; or

(ii) a barrette at least 3 m in length.

(e) Barrettes of 4 m in length should be so designed if it is anticipated that the simple approach lighting system should be developed into a precision approach lighting system.

(f) Where provided for a non-instrument runway, the lights shall show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights shall be adequate for all conditions of visibility and ambient light for which the system has been provided.

(g) Where provided for a non-precision approach runway, the lights shall show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights shall be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system should remain usable.

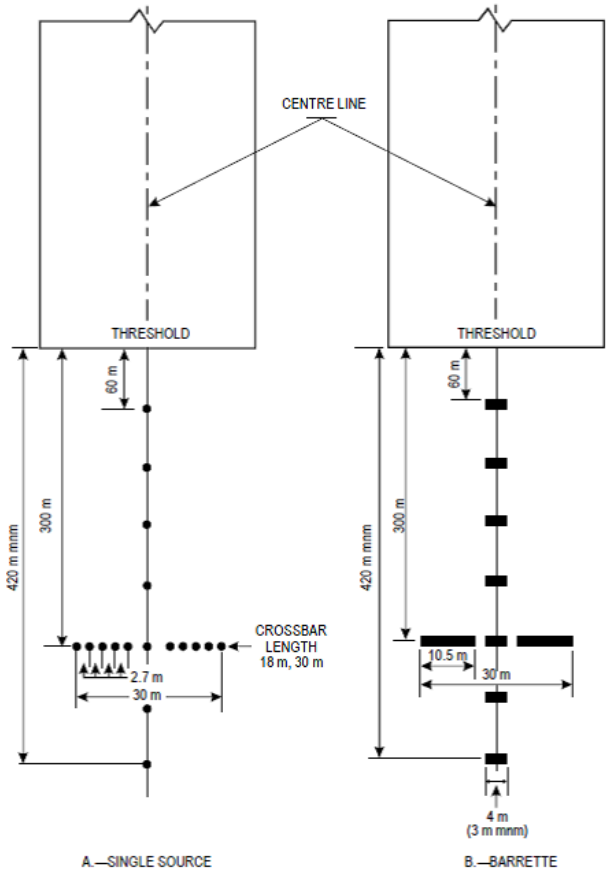


Figure CS-75: Simple approach lighting systems

CS ADR-DSN.M.626 Simple approach lighting systems

(a) When the barrette as in d ii) is composed of lights approximating to point sources, a spacing of 1.5 m between adjacent lights in the barrette has been found satisfactory.

(b) At locations where identification of the simple approach lighting system is difficult at night due to surrounding lights, sequence flashing lights installed in the outer portion of the system may resolve this problem.

CS ADR-DSN.M.630 Precision approach Category I lighting system

(a) The safety objective of the approach lighting system is to provide alignment and roll guidance, and limited distance-to-go information to enable safe approach to a runway.

(b) Location and composition

(1) General: A precision approach Category I lighting system shall consist of a row of lights on the extended centre line of the runway extending wherever possible, over a distance of 900 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a

distance of 300 m from the runway threshold.

(2) Crossbar lights: The lights forming the crossbar shall be as close as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

(3) Centre line lights: The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

(4) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

(iii) Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(c) Characteristics:

(1) The extended centre line and crossbar lights of a precision approach Category I lighting system shall be fixed lights showing variable white. Each centre line light position shall consist of either:

(i) a single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line, and three light sources in the outer 300 m of the centre line to provide distance information; or

(ii) a barrette.

(2) Where the serviceability level of the approach lights specified as a maintenance objective in ADR.OPS.C.015 can be demonstrated, each centre line light position may consist of either:

(i) a single light source; or

(ii) a barrette.

When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m. The barrettes shall be at least 4 m in length.

(3) If the centre line consists of lights as described in paragraph (c)(1)(i) or (c)(2)(i) above, additional crossbars of lights to the crossbar provided at 300 m from the threshold shall be provided at 150 m, 450 m, 600 m and 750 m from the threshold. The lights forming each crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

(4) Where the additional crossbars are incorporated in the system, the outer ends of the crossbars shall lie on two straight lines that either are parallel to the line of the centre line lights or converge to meet the runway centre line 300 m upwind from threshold.

(5) The characteristics of lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-5. The chromaticity of lights should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(6) If the centre line consists of barrettes as described in paragraph (c)(1)(ii) or (c)(2)(ii) above, each barrette should be supplemented by a flashing light, except where such lighting is considered unnecessary , taking into account the characteristics of the system, and the nature of the meteorological conditions.

(7) Each flashing light, as described in paragraph (c)(6), shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

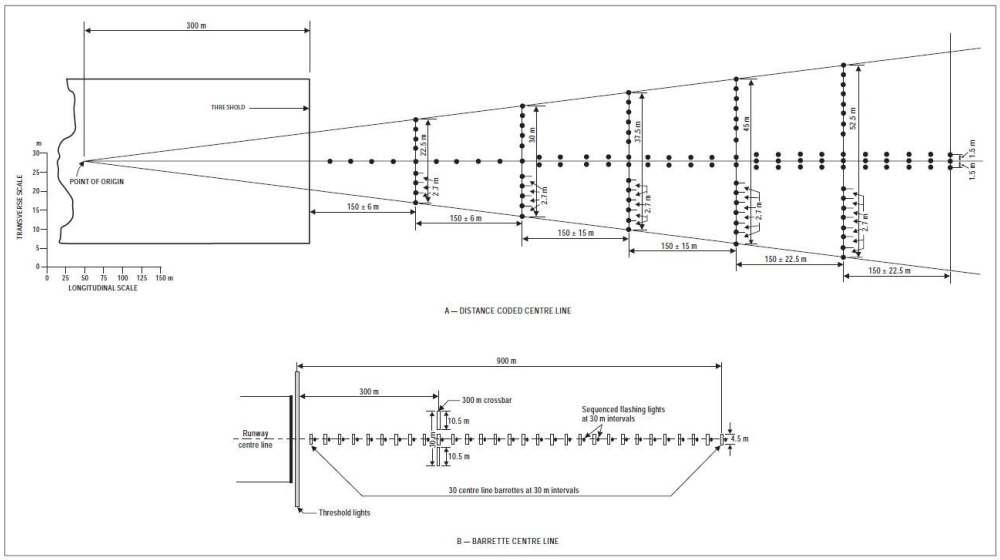


Figure CS-76: Precision approach Category I lighting systems

GM1 ADR-DSN.M.630 Precision approach Category I lighting system

(a) The installation of an approach lighting system of less than 900 m in length may result in operational limitations on the use of the runway.

(b) Spacings for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and firefighting vehicles.

(c) The flashing light system provides a long-distance information about the location and orientation of an active runway to the approaching pilots. Particularly in the surrounding of cities with urban lighting of streets, places and buildings, the flashing light system allows a clear identification of the approach by the flight crew. To prevent glare at night and have clear visibility, the high-intensity flashing light should be provided with an appropriate intensity control.

CS ADR-DSN.M.635 Precision approach Category II and III lighting system

(a) Location and composition:

(1) The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, over a distance of 900 m from the runway threshold. In addition, the system shall have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure CS-77. Where the serviceability level of the approach lights specified as maintenance objectives in

ADR.OPS.C.015 can be demonstrated, the system may have two side rows of lights extending 240 m from the threshold, and two crossbars, one at 150 m, and one at 300 m from the threshold, all as shown in Figure CS-78.

(2) The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

(3) The lights forming the side rows shall be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold. Where the serviceability level of the approach lights specified as maintenance objectives can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60 m with the first light located 60 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side rows shall be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event shall be equal to that of the touchdown zone lights.

(4) The crossbar provided at 150 m from the threshold shall fill in the gaps between the centre line and side row lights.

(5) The crossbar provided at 300 m from the threshold shall extend on both sides of the centre line lights to a distance of 15 m from the centre line.

(6) If the centre line beyond a distance of 300 m from the threshold consists of lights as described in paragraphs (b)(2)(ii) and (b)(3)(ii) , additional crossbars of lights shall be provided at 450 m, 600 m and 750 m from the threshold. Where such additional crossbars are incorporated in the system, the outer ends of these crossbars shall lie on two straight lines that either are parallel to the centre line or converge to meet the runway centre line 300 m from the threshold.

(7) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching

aircraft.

`Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(b) Characteristics:

(1) The centre line of a precision approach Category II and III lighting system for the first 300 m from the threshold shall consist of barrettes showing variable white, except that where the threshold is displaced 300 m or more, the centre line may consist of single light sources showing variable white. Where the serviceability level of the approach lights specified in ADR.OPS.C.015 can be demonstrated, the centre line of a precision approach Category II and III lighting system for the first 300 m from the threshold may consist of:

(i) barrettes where the centre line beyond 300 m from the threshold consists of barrettes as described in paragraph (b)(3)(i) below; or

(ii) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in paragraph (b)(3)(ii) below, with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or

(iii) single light sources where the threshold is displaced 300 m or more; all of which shall show variable white.

(2) Beyond 300 m from the threshold each centre line light position shall consist of either:

(i) a barrette as used on the inner 300 m; or

(ii) two light sources in the central 300 m of the centre line, and three light sources in the outer 300 m of the centre line;

all of which shall show variable white.

(3) Where the serviceability level of the approach lights in ADR.OPS.C.015 as maintenance objectives can be demonstrated beyond 300 m from the threshold, each centre line light position may consist of either:

(i) a barrette; or

(ii) a single light source;

all of which shall show variable white.

(4) The barrettes shall be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m.

(5) If the centre line beyond 300 m from the threshold consists of barrettes as described in paragraphs (b)(2)(i) and (b)(3)(i), each barrette beyond 300 m should be supplemented by a flashing light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(6) Each flashing light as described in (5) shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

(7) The side row shall consist of barrettes showing red. The length of a side row barrette and the spacing of its lights shall be equal to those of the touchdown zone light barrettes.

(8) The lights forming the crossbars shall be fixed lights showing variable white. The lights shall be uniformly spaced at intervals of not more than 2.7 m.

(9) The intensity of the red lights shall be compatible with the intensity of the white lights.

(10) The characteristics of lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-5 or U-6, as appropriate.

The chromaticity of lights shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

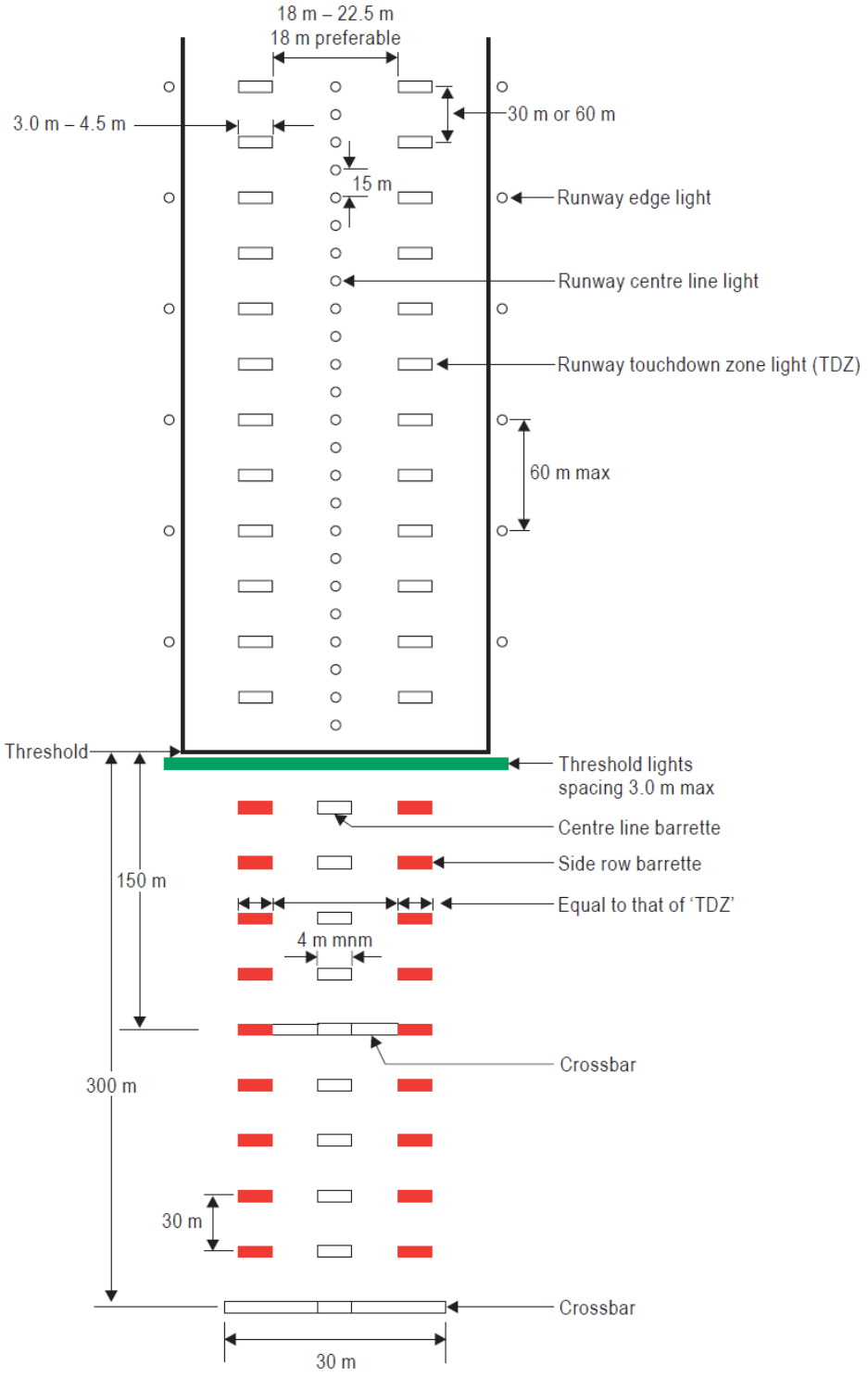


Figure CS-79: Inner 300 m approach and runway lighting for precision approach runways, Categories II and III

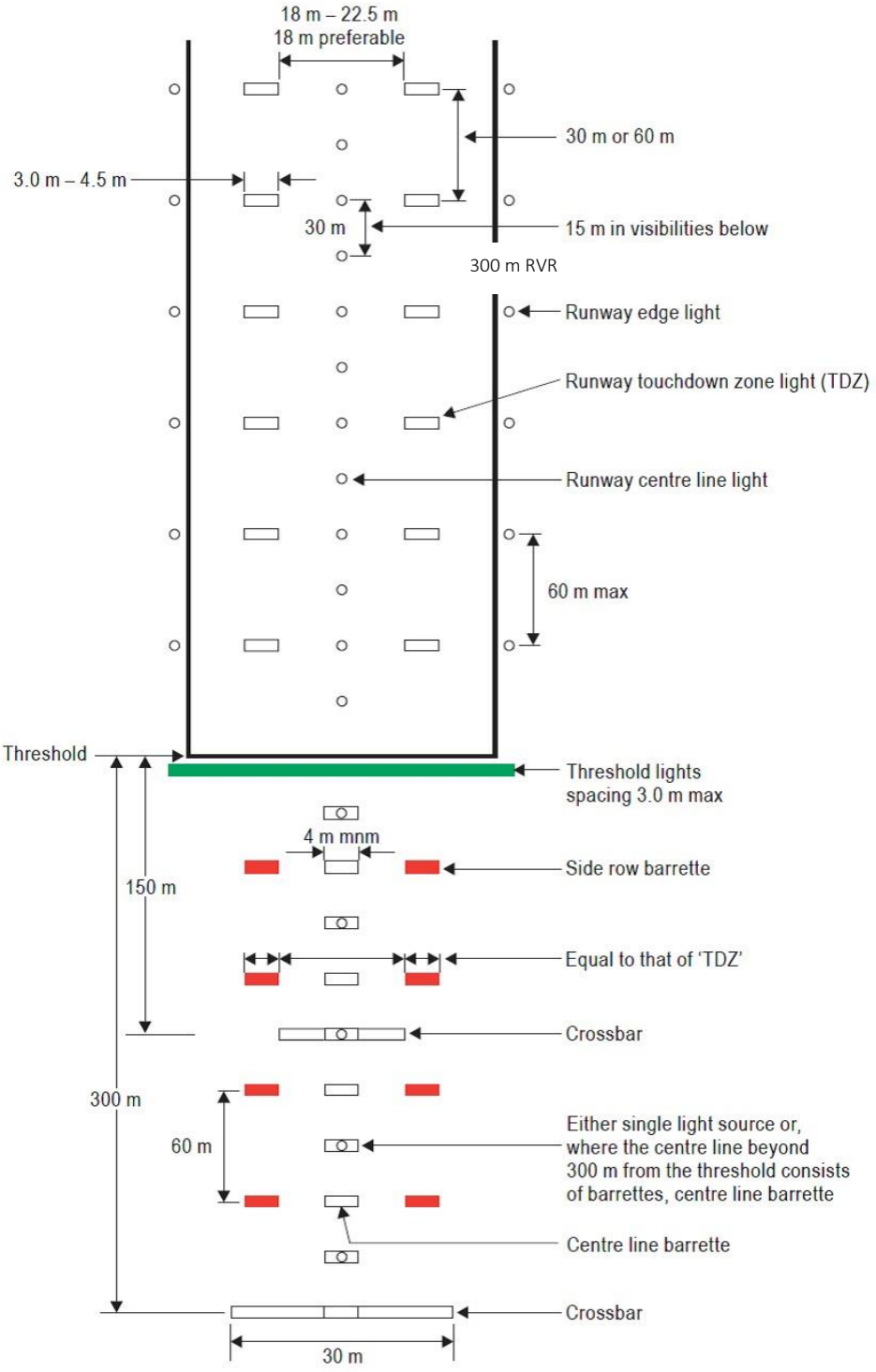


Figure CS-80: Inner 300 m approach and runway lighting for precision approach runways, Categories II and III, where the serviceability levels of the lights specified as maintenance objectives in ADR.OPS.C.015(b)(1) to (3) can be demonstrated

GM1 ADR-DSN.M.635 Precision approach Category II and III lighting system

The length of 900 m is based on providing guidance for operations under Category I, II and III conditions. Reduced lengths may support Category II and III operations but may impose limitations on Category I operations.

CS ADR-DSN.M.640 Visual approach slope indicator systems

(a) The safety objective of visual approach slope indicators is to provide information on the approach angle necessary to maintain a safe height over obstacles and threshold.

(b) A visual approach slope indicator system shall be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or by non-visual aids where one or more of the following conditions exist:

(1) the runway is used by turbojet or other aircraft with similar approach guidance requirements;

(2) the pilot of any type of aeroplane may have difficulty in judging the approach due to:

(i) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night; or

(ii) misleading information such as is produced by deceptive surrounding terrain or runway slopes.

(3) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects;

(4) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

(5) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

(c) The standard visual approach slope indicator systems shall consist of PAPI and APAPI systems conforming to the specifications, as prescribed in CS ADR-DSN.M.645 to CS ADR-DSN.M.655.

(d) PAPI shall be provided where the code number is 3 or 4 when one or more of the conditions

specified in paragraph (b) above exist.

(e) PAPI or APAPI shall be provided where the code number is 1 or 2 when one or more of the conditions specified in paragraph (b) above exist.

(f) Where a runway threshold is temporarily displaced from the normal position and one or more of the conditions specified in (b) exist, a PAPI should be provided except that where the Code Number is 1 or 2 an APAPI may be provided.

GM.ADR-DSN.M.640 Visual approach slope indicator systems

(a) Factors that should be considered when making a decision on which runway on an aerodrome should receive first priority for the installation of a visual approach slope indicator system are:

(1) frequency of use;

(2) seriousness of the hazard;

(3) presence of other visual and non-visual aids;

(4) type of aeroplanes using the runway; and

(5) frequency and type of adverse weather conditions under which the runway should be used.

(b) With respect to the seriousness of the hazard, the order given in the CS ADR-DSN.M.640 may be used as a general guide. These may be summarized as:

(1) inadequate visual guidance because of:

(i) approaches over water or featureless terrain, or absence of sufficient extraneous light in the approach area by night;

(ii) deceptive surrounding terrain.

(2) serious hazard in approach;

(3) serious hazard if aeroplanes undershoot or overrun; and

(4) unusual turbulence.

(c) The presence of other visual or non-visual aids is a very important factor. Runways equipped with ILS or MLS would generally receive the lowest priority for a visual approach slope indicator

system installation. It should be remembered, though, that visual approach slope indicator systems are visual approach aids in their own right and can supplement electronic aids. When serious hazards exist and/or a substantial number of aeroplanes not equipped for ILS or MLS use a runway, priority might be given to installing a visual approach slope indicator on this runway.

(d) Priority may be given to runways used by turbojet aeroplanes.

(e) Where a runway threshold is temporarily displaced from the normal position and one or more of the conditions specified in paragraph (a) above exist, a PAPI should be provided except that where the code number is 1 or 2 either an APAPI may be provided.

CS ADR-DSN.M.645 Precision Approach Path Indicator and Abbreviated Precision Approach Path Indicator (PAPI and APAPI)

(a) A PAPI or APAPI shall be in accordance with the specifications provided in paragraphs CS ADR-DSN.M.645 to CS ADR-DSN.M.655.

(b) Definition and positioning:

(1) The PAPI system shall consist of a wing bar of four sharp transition multi-lamp (or paired single lamp) units equally spaced.

(2) The APAPI system shall consist of a wing bar of two sharp transition multi-lamp (or paired single lamp) units.

(3) The PAPI and APAPI system shall be located on the left side of the runway unless it is physically impracticable to do so. Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, then a second wing bar may be provided on the opposite side of the runway for PAPI or APAPI.

(4) The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

(ii) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

(iii) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

(5) The wing bar of an APAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;

(ii) when above the approach slope, see both the units as white; and

(iii) when below the approach slope, see both the units as red.

(6) The light units shall be located as in the basic configuration illustrated in Figure CS-81, subject to the installation tolerances given therein. The units forming a wing bar shall be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units shall be mounted as low as possible and shall be frangible.

(c) Characteristics:

(1) The system shall be suitable for both day and night operations.

(2) Colour:

(i) The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3′.

(ii) At full intensity, the chromaticity of lights units shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate, and the red light shall have a Y coordinate not exceeding 0.320.

(3) Intensity:

(i) The light intensity distribution of the light units shall be as shown in CS ADR-DSN.U.940, Figure U-26.

(ii) Suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

(4) Light orientation: Each light unit shall be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30´and at least 4°30´above the horizontal.

Other characteristics: The light units shall be so designed that deposits of dirt, or other contaminants, on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.

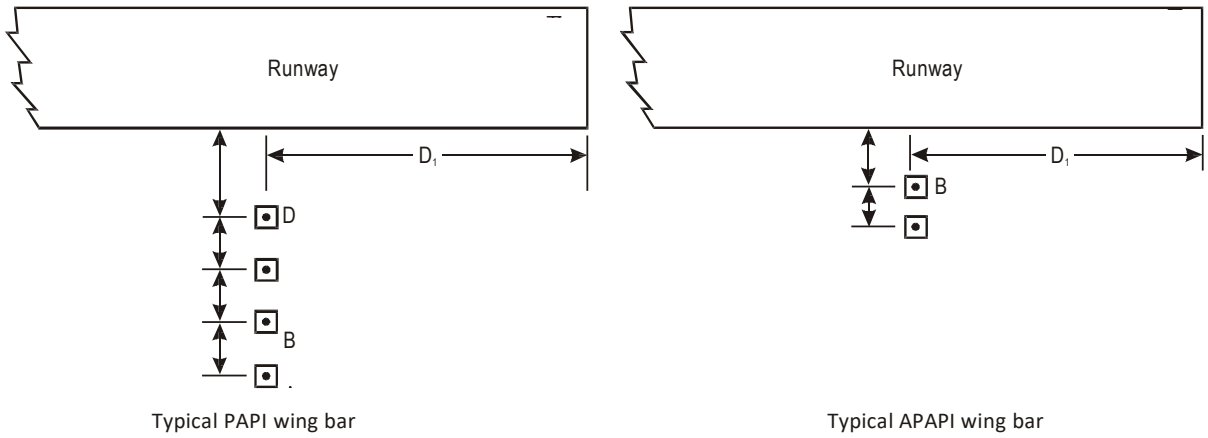


Figure CS-82: Siting of PAPI and APAPI

INSTALLATION TOLERANCES

(a) Where a PAPI or APAPI is installed on a runway not equipped with an ILS or MLS, the distance D1 shall be calculated to ensure that the lowest height at which a pilot will see a correct approach path indication (Figure CS-83:(b), angle B for a PAPI and angle A for an APAPI) provides the wheel clearance over the threshold specified in Table -47 for the most demanding amongst aircraft regularly using the runway.

(b) Where a PAPI or APAPI is installed on a runway equipped with an ILS and/or MLS, the distance D1 shall be calculated to provide the optimum compatibility between the visual and non-visual aids for the range of eye-to- antenna heights of the aeroplanes regularly using the runway. The distance shall be equal to that between the threshold and the effective origin of the ILS glide path or MLS minimum glide path, as appropriate, plus a correction factor for the variation of eye-to- antenna heights of the aeroplanes concerned. The correction factor is obtained by multiplying the average eye-to-antenna height of those aeroplanes by the cotangent of the approach angle. However, the distance

shall be such that in no case will the wheel clearance over the threshold be lower than that specified in column (3) of Table CS-47.

(c) If a wheel clearance, greater than that specified in a) above is required for specific aircraft, this can be achieved by increasing D1.

(d) Distance D1 shall be adjusted to compensate for differences in elevation between the lens centres of the light units and the threshold.

(e) To ensure that units are mounted as low as possible and to allow for any transverse slope, small height adjustments of up to 5 cm between units are acceptable. A lateral gradient not greater than 1.25 per cent can be accepted provided it is uniformly applied across the units.

(f) A spacing of 6 m (±1 m) between PAPI units should be used on code numbers 1 and 2. In such an event, the inner PAPI unit shall be located not less than 10 m (±1 m) from the runway edge.

(g) The lateral spacing between APAPI units may be increased to 9 m (±1 m) if greater range is required or later conversion to a full PAPI is anticipated. In the latter case, the inner APAPI unit shall be located 15 m (±1 m) from the runway edge.

Note: See CS ADR-DSN.L.540 for specifications on aiming point marking.

GM1 CS ADR-DSN.M.645 Precision Approach Path Indicator and Abbreviated Precision Approach Path Indicator (PAPI and APAPI)

(a) Further guidance on the harmonisation of PAPI, ILS and/or MLS signals is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(b) Reducing the spacing between light units results in a reduction in usable range of the system.

CS ADR-DSN.M.650 Approach slope and elevation setting of light units for PAPI and APAPI

(a) Approach slope:

(1) The approach slope as defined in Figure CS-84 (b), shall be so designed to be appropriate for use by the aircraft in the approach.

(2) When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

(b) Elevation setting of light units

(1) The angle of elevation settings of the light units in a PAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin (see Table CS-51).

(2) The angle of elevation settings of the light units in an APAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing the lowest on-slope signal, i.e. one white and one red, will clear all objects in the approach area by a safe margin (see Table CS-52).

(3) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction shall be such that the object remains outside the confines of the light beam.

(4) Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units shall be set at the same angle so that the signals of each wing bar change symmetrically at the same time.

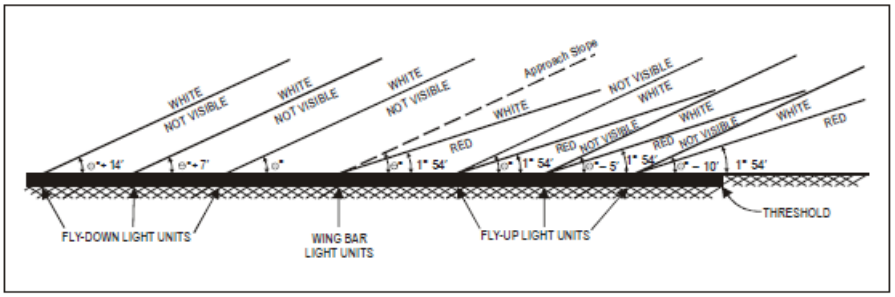
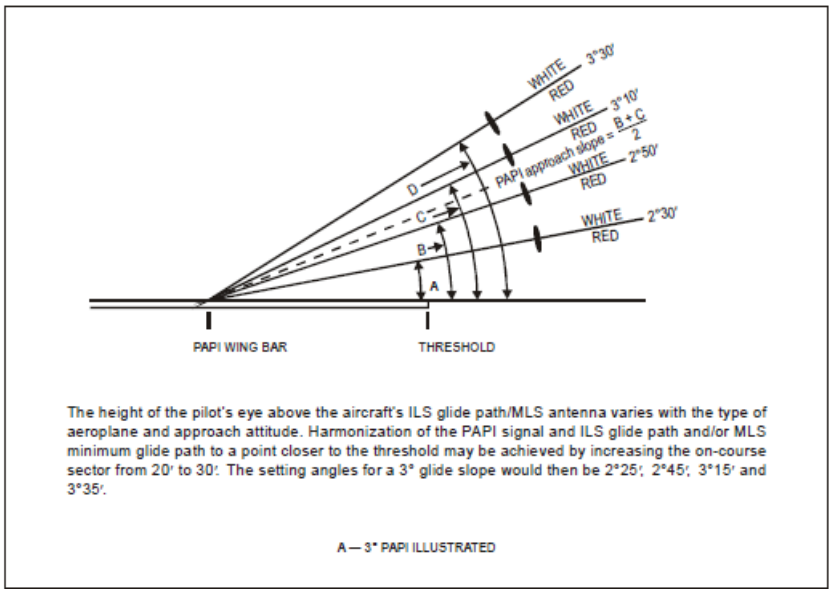
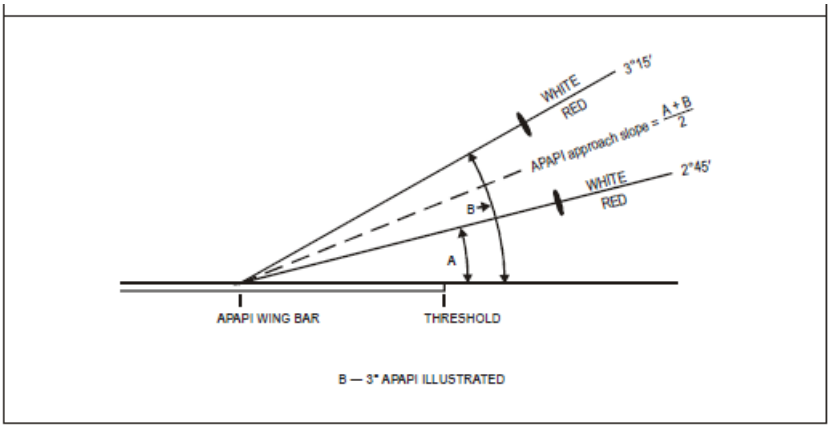


Figure CS-85:(a)Light beams and angle of elevation setting for PAPI and APAPI



The height of the pilot's eye above the aircraft's ILS glide path/MLS antenna varies with the type of aeroplane and approach attitude. Harmonization of the PAPI signal and ILS glide path and/or MLS minimum glide path to a point closer to the threshold may be achieved by increasing the on-course sector from 20′ to 30′. The setting angles for a 3° glide slope would then be 2°25′, 2°45′, 3°15′ and 3°35′.

A — 3° PAPI ILLUSTRATED



B — 3° APAPI ILLUSTRATED

Figure CS-86:(b)Light beams and angle of elevation setting for PAPI and APAPI

Eye-to-wheel height of aeroplane in the approach configuration [a]	Desired wheel clearance (metres)[b, c]	Minimum wheel clearance (metres)
(1)	(2)	(3)
up to but not including 3 m	6	3[e]
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5

8 m up to but not including 14 m	9	6

a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis should be considered. The most demanding amongst such aeroplanes should determine the eye-to-wheel height group.

b. Where practicable, the desired wheel clearances shown in column (2) should be provided.

c. The wheel clearances in column (2) should be reduced to no less than those in column (3) where a safety assessment indicates that such reduced wheel clearances are acceptable.

d. When a reduced wheel clearance is provided at a displaced threshold, it should be ensured that the corresponding desired wheel clearance specified in column (2) should be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.

e. This wheel clearance should be reduced to 1.5 m on runways used mainly by light-weight non-turbo- jet aeroplanes.

Table CS-53: Wheel clearance over threshold for PAPI and APAPI

CS ADR-DSN.M.655 Obstacle protection surface for PAPI and APAPI

(a) Applicability:

An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.

(b) Characteristics:

The characteristics of the obstacle protection surface, i.e. origin, divergence, length, and slope shall correspond to those specified in the relevant column of Table CS-54 and in Figure CS-87.

(c) New objects or extensions of existing objects shall not be permitted above an obstacle protection surface except when in the opinion of the appropriate authority the new object or extension would be shielded by an existing immovable object, or if after, aeronautical study it is determined that the object would not adversely affect the safety of operations of aircraft.

(d) Existing objects above an obstacle protection surface shall be removed except when, in the opinion of the Appropriate Authority, the object is shielded by an existing immovable object, or after an

aeronautical study it is determined that the object would not adversely affect the safety of operations of aircraft.

(e) Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of aeroplanes one or more of the following measures shall be taken:

(1) remove the object;

(2) suitably raise the approach slope of the system;

(3) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

(4) displace the axis of the system and its associated obstacle protection surface by no more than 5°;

(5) suitably displace the threshold; and

(6) where (5) is found to be impracticable, suitably displace the system upwind of the threshold such that the object no longer penetrates the obstacle protection surface.

	Runway type/code number							
	Non-instrument				Instrument			
	Code number				Code number			
Surface dimension	1	2	3	4	1	2	3	4
Length of inner edge	60 m	80 m	150 m	150 m	150 m	150 m	300 m	300 m
Distance from the	D_1+30 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m
Divergence (each	10 %	10 %	10 %	10 %	15 %	15 %	15 %	15 %
Total length	7 500 m	7 500 m	15 000 m	15 000 m	7 500 m	7 500 m	15 000 m	15 000 m
Slope								
a) PAPI[1]	—	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°
b) APAPI[1]	A–0.9°	A–0.9°	–	–	A–0.9°	A–0.9°	–	–
[1] Angles as indicated in Figure CS-81.								

Table CS-55: Dimensions and slopes of the obstacle protection surface

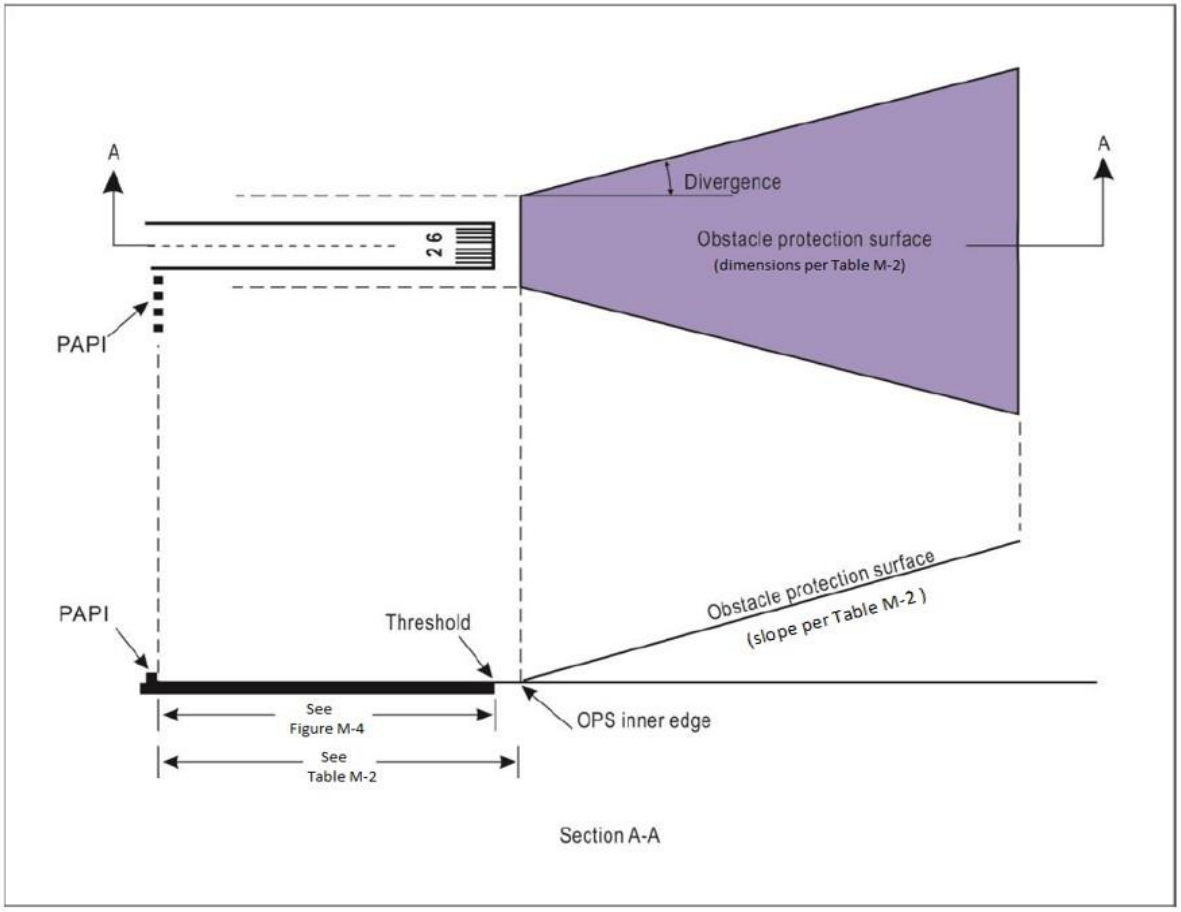


Figure CS-88: Obstacle protection surface for visual approach slope indicator systems

GM1 ADR-DSN.M.655 Obstacle protection surface for PAPI and APAPI

(a) The displacement of the system upwind of the threshold reduces the operational landing distance.

(b) Additional guidance on the calculation for siting PAPI/ APAPI on a runway with ILS/MLS is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

CS ADR-DSN.M.656 Flight calibration of PAPI and APAPI

Flight inspection of a new installation shall be undertaken by a qualified service provider authorised by the aerodrome operator to confirm the correct operation of the system. The inspection shall include checks of range, setting angles, brilliancy control and compatibility with the precision instrument glide path, if provided.

CS ADR-DSN.M.657 T-VASIS and AT-VASIS

Description

(a) The T-VASIS shall consist of twenty light units symmetrically disposed about the runway centre line in the form of two wing bars of four light units each, with bisecting longitudinal lines of six lights.

(b) The AT-VASIS shall consist of ten light units arranged on one side of the runway in the form of a single wing bar of four light units with a bisecting longitudinal line of six lights.

(c) The light units shall be constructed and arranged in such a manner that the pilot of an aeroplane during an approach will:

(1) when above the approach slope, see the wing bar(s) white, and one, two or three fly-down lights, the more fly-down lights being visible the higher the pilot is above the approach slope;

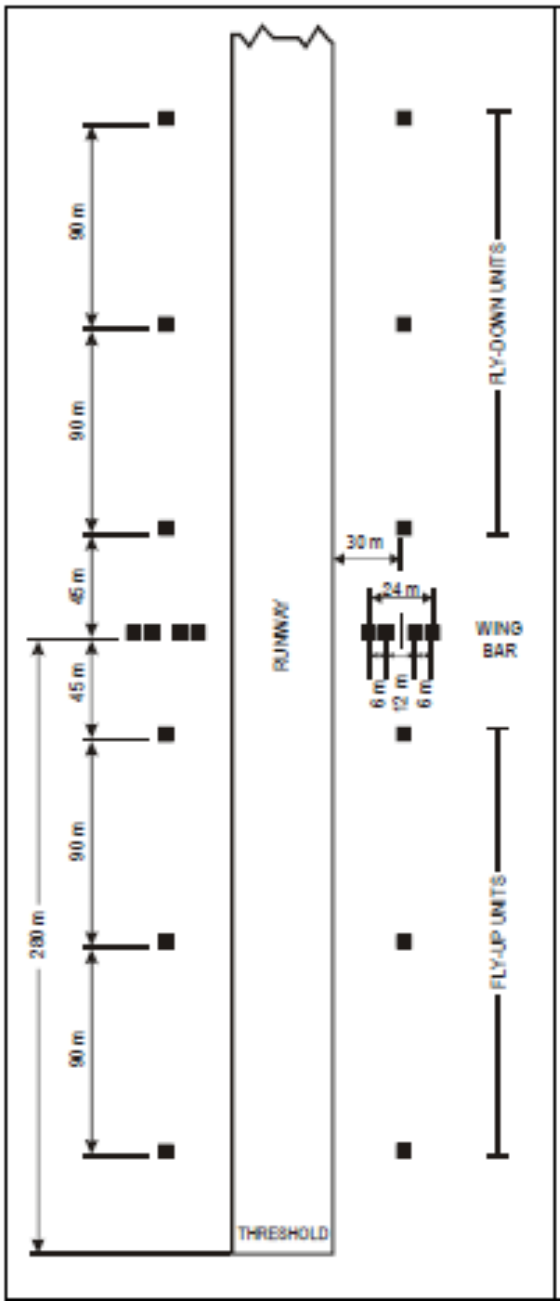
(2) when on the approach slope, see the wing bar(s) white; and

(3) when below the approach slope, see the wing bar(s) and one, two or three fly-up lights white, the more fly-up lights being visible the lower the pilot is below the approach slope; and when well below the approach slope, see the wing bar(s) and the three fly-up lights red.

When on or above the approach slope, no light shall be visible from the fly-up light units; when on or below the approach slope, no light shall be visible from the fly-down light units.

Siting

(a) The light units shall be located as shown in Figure below, subject to the installation tolerances given therein.



INSTALLATION TOLERANCES

The appropriate authority may:

a) vary the nominal eye height over the threshold of the on-slope signal between the limits of 12 m and 16 m, except in cases where a standard ILS glide path and/or MLS minimum glide path is available; the height over threshold should be varied to avoid any conflict between the visual approach slope indications and the usable portion of the ILS glide path and/or MLS minimum glide path indications;

b) vary the longitudinal distance between individual light units or the overall length of the system by not more than 10 per cent;

c) vary the lateral displacement of the system from the runway edge by not more than ±3 m;

Note.— The system must be symmetrically displaced about the runway centre line.

d) where there is a longitudinal slope of the ground, adjust the longitudinal distance of a light unit to compensate for its difference in level from that of the threshold; and

e) where there is a transverse slope in the ground, adjust the longitudinal distance of two light units or two wing bars to compensate for the difference in level between them as necessary to meet the requirements of 5.3.5.17.

The distance between the wing bar and the threshold is based on an approach slope of 3° to a level runway with a nominal eye height over the threshold of 15 m. In practice, the threshold to wing bar distance is determined by:

a) the selected approach slope;

b) the longitudinal slope of the runway; and

c) the selected nominal eye height over the threshold.

(b) The siting of T-VASIS will provide, for a 3° slope and a nominal eye height over the threshold of 15 m, a pilot's eye height over threshold of 13 m to 17 m when only the wing bar lights are visible. If increased eye height at the threshold is required (to provide adequate wheel clearance), then the approaches may be flown with one or more fly-down lights visible. The pilot's eye height over the threshold is then of the following order:

Wing bar lights and one fly-down light visible	17 m to 22 m
Wing bar lights and two fly-down lights visible	22 m to 28 m

(c) Wing bar lights and three fly-down lights visible 28 m to 54 m.

Characteristics of the light units

(a) The systems shall be suitable for both day and night operations.

The light distribution of the beam of each light unit shall be of fan shape showing over a wide arc in azimuth in the approach direction. The wing bar light units shall produce a beam of white light from 1°54□□vertical angle up to 6° vertical angle and a beam of red light from 0° to 1°54□□vertical angle. The fly-down light units shall produce a white beam extending from an elevation of 6° down to approximately the approach slope, where it shall have a sharp cut-off. The fly-up light units shall produce a white beam from approximately the approach slope down to 1°54□□vertical angle and a red beam below a 1°54□□vertical angle. The angle of the top of the red beam in the wing bar units and fly-up units may be increased to comply with the requirements in Approach slope and elevation setting of light beams

(b) The light intensity distribution of the fly-down, wing bar and fly-up light units shall be as shown in light intensity distribution of T-VASIS and AT-VASIS in Annex 14

(c) The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur over a vertical angle of not more than 15□.

(d) At full intensity the red light shall have a Y coordinate not exceeding 0.320.

(e) suitable intensity control shall be provided to allow adjustments to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

(f) light units forming the wing bars, or the light units forming a fly-down or a fly-up matched pair, shall be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units shall be mounted as low as possible and shall be frangible.

(g) The light units shall be so designed that deposits of condensation, dirt, etc., on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall in no way affect the elevation of the beams or the contrast between the red and white signals. The construction of the light units shall be such as to minimize the probability of the slots being wholly or partially blocked ,where these conditions are likely to be encountered

Approach slope and elevation setting of light beams

(a) the approach slope shall be appropriate for use by the aeroplanes using the approach.

(b) when the runway on which a T-VASIS is provided is equipped with an ILS and/or MLS, the siting and elevations of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

(c) the elevation of the beams of the wing bar light units on both sides of the runway shall be the same. The elevation of the top of the beam of the fly-up light unit nearest to each wing bar, and that of the bottom of the beam of the fly down light unit nearest to each wing bar, shall be equal and shall correspond to the approach slope. The cut-off angle of the top of the beams of successive fly-up light units shall decrease by 5 of arc in angle of elevation at each successive unit away from the wing bar. The cut-in angle of the bottom of the beam of the fly-down light units shall increase by 7' of arc at each successive unit away from the wing bar (see Figure 5-18 in Annex 14).

(d) The elevation setting of the top of the red light beams of the wing bar and fly-up light units shall be such that, during an approach, the pilot of an aeroplane to whom the wing bar and three fly-up light units are visible would clear all objects in the approach area by a safe margin if any such light did not appear red.

(e) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction shall be such that the object remains outside the confines of the light beam.

CS ADR-DSN.M.660 Circling guidance lights

(a) Applicability: Circling guidance lights should be provided when existing approach and runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft intending to carry out circling approaches.

(b) Location and positioning:

(1) The location and number of circling guidance lights shall be adequate to enable a pilot, as appropriate, to:

(i) join the downwind leg or align and adjust the aircraft's track to the runway at a required distance from it and to distinguish the threshold in passing; and

(ii) keep in sight the runway threshold and/or other features which should make it possible to judge the turn on to base leg and final approach, taking into account the guidance provided by other visual aids.

(2) Circling guidance lights when provided shall consist of:

(i) lights indicating the extended centre line of the runway and/or parts of any approach lighting system; or

(ii) lights indicating the position of the runway threshold; or

(iii) lights indicating the direction or location of the runway;

or a combination of such lights as is appropriate to the runway under consideration.

(c) Characteristics:

(1) Circling guidance lights shall be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches. The flashing lights shall be white, and the steady lights either white or gaseous discharge lights.

(2) The lights shall be designed and be installed in such a manner that they should not dazzle or confuse a pilot when approaching to land, taking off, or taxiing.

GM1 ADR-DSN.M.660 Circling guidance lights

Guidance on installation of circling guidance lights is given in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.M.665 Runway lead-in lighting systems

(a) Applicability: A runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

(b) Location and positioning

(1) A runway lead-in lighting system when provided shall consist of groups of lights positioned:

(i) so as to define the desired approach path. Runway lead-in lighting systems may be curved, straight, or a combination thereof; and

(ii) so that one group may be sighted from the preceding group.

(2) The interval between adjacent groups should not exceed approximately 1 600 m.

(3) A runway lead-in lighting system shall extend from a point as determined up to a point where the approach lighting system if provided, or the runway lighting system is in view.

(c) Characteristics

(1) Each group of lights of a runway lead-in lighting system when provided shall consist of at least three flashing lights in a linear or cluster configuration. The system may be augmented by steady burning lights where such lights would assist in identifying the system.

(2) The flashing lights and steady burning lights shall be white.

(3) The flashing lights in each group shall flash in sequence towards the runway.

CS ADR-DSN.M.670 Runway threshold identification lights

(a) Runway threshold identification lights shall be installed:

(i) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary or where it is not practicable to provide other approach lighting aids; and

(ii) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.

(b) Location: Runway threshold identification lights shall be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.

(c) Characteristics:

(i) Runway threshold identification lights shall be flashing white lights with a flash frequency

between 60 and 120 per minute;

(ii) The lights shall be visible only in the direction of approach to the runway.

CS ADR-DSN.M.675 Runway edge lights

(a) Applicability:

(1) Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

(2) Runway edge lights should be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day.

(b) Location and positioning:

(1) Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.

(2) Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

(3) Where the width of the area which could be declared as runway, exceeds 60 m, the distance between the rows of lights shall be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

(4) The lights shall be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis shall be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

(c) Characteristics:

(1) Runway edge lights shall be fixed lights showing variable white, except that:

(i) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

(ii) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is

started, may show yellow.

(iii) in the case of a runway starter extension the lights between the beginning of the runway starter extension and the threshold shall show red in the approach direction and blue in the opposite direction.

(2) The runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they shall show at all angles in azimuth.

(d) In all angles of azimuth, as prescribed in paragraph (c)(2) above, runway edge lights shall show at angles up to 15° above the horizontal with intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity shall be at least 50 cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilot.

(e) Runway edge lights characteristics on a precision approach runway shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-13 or Figure U-14, as appropriate.

(f) The chromaticity of lights shall be in accordance with the specifications in CS ADR-DSN.U.930 and in Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.680 Runway threshold and wing bar lights

(a) Runway threshold lights shall be provided for a runway equipped with runway edge lights, except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

(b) Location and positioning of runway threshold lights:

(1) When a threshold is at the extremity of a runway, the threshold lights shall be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

(2) When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

(3) Threshold lighting shall consist of:

(i) on a non-instrument or non-precision approach runway, at least six lights;

(ii) on a precision approach runway Category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and

(iii) on a precision approach runway Category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

(4) The lights prescribed in paragraphs (b)(3)(i) and (b)(3)(ii) above should be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, or otherwise not more than half the distance between the rows of runway edge lights.

(c) Applicability of wing bar lights:

(1) Wing bar lights should be provided on a precision approach runway when additional conspicuity is considered desirable.

(2) Wing bar lights shall be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.

(d) Location and positioning of wing bar lights: Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar shall be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

(e) Characteristics of runway threshold and wing bar lights:

(1) Runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

(2) Runway threshold lights on a precision approach runway shall be in accordance with the

specifications in CS ADR-DSN.U.940, Figure U-7.

(3) Threshold wing bar lights on a precision approach runway shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-8.

(4) The chromaticity of lights shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.685 Runway end lights

(a) Applicability: Runway end lights shall be provided for a runway equipped with runway edge lights.

(b) Location and positioning:

(1) Runway end lights shall be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.

(2) Where a runway starter extension is provided, the runway end lights shall be placed at the limit of the runway available for roll-out.

(3) Runway end lighting shall consist of at least six lights. The lights should be either:

(i) equally spaced between the rows of runway edge lights; or

(ii) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

(iii) disposed as stated in 3(ii) above , where a runway starter extension is provided.

(4) For a precision approach runway Category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, shall not exceed 6 m.

(c) Characteristics of runway end lights:

(1) Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

(2) Runway end lights characteristics on a precision approach runway shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-12.

(3) Runway end lights on a precision approach runway shall be in accordance with the chromaticity specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.685 Runway end lights

(a) Lighting circuitry should be such that the failure of one lighting circuit will not result in the number of working runway end lights being less than six.

(b) When the threshold is at the runway extremity, fittings serving as threshold lights may be used as runway end lights.

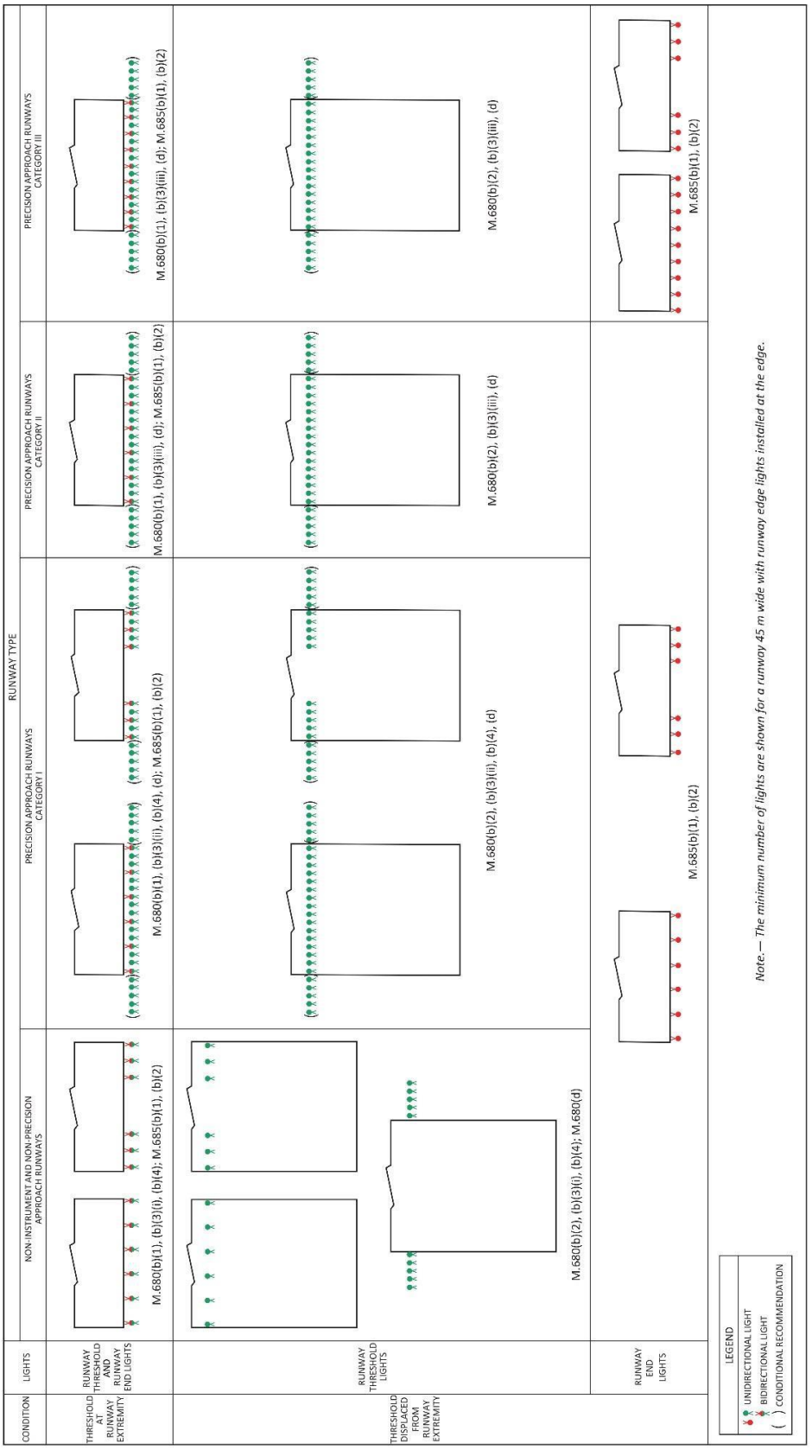


Figure CS-89: Arrangement of runway threshold and runway end lights

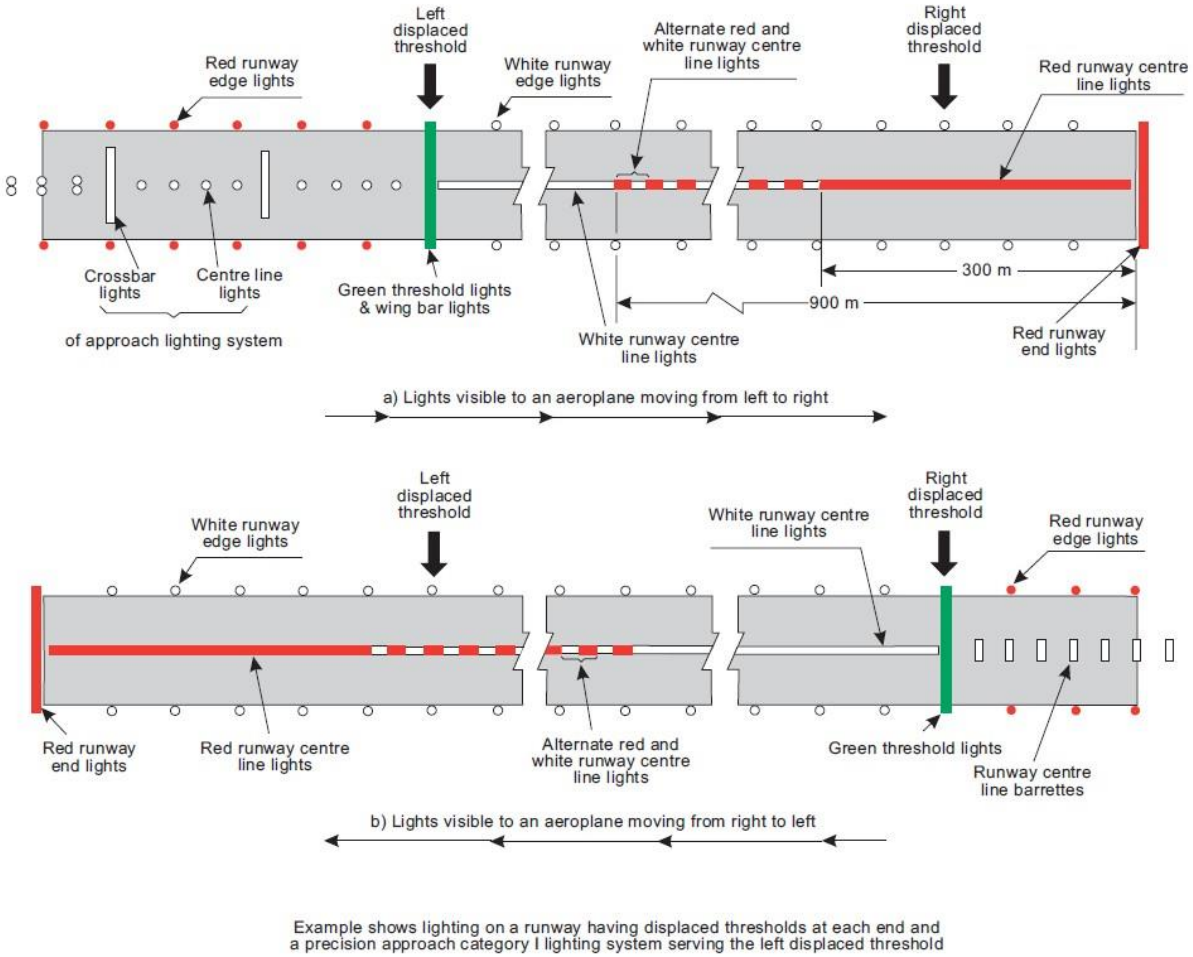


Figure CS-90: Example of approach and runway lighting for runway with displaced thresholds

CS ADR-DSN.M.690 Runway centre line lights

(a) The safety objective of runway centre line lights is to facilitate safe take-off and landing.

(b) Applicability:

(1) Runway centre line lights shall be provided on a precision approach runway Category II or III.

(2) Runway centre line lights shall be provided on a runway intended to be used for take- off with an operating minimum below an RVR of the order of 400 m.

(3) Runway centre line lights shall be provided on a Precision Approach Runway Category I when the runway is used by aircraft with high landing speeds or where the width, as measured perpendicular to the runway centre line, between the runway edge lights is greater than 50

m.

(4) Runway centre line lights shall be provided on a runway intended to be used for take- off with an operating minimum below an RVR of the order of 400 m or higher when used by aeroplanes with a very high take-off speed, or where the width, as measured perpendicular to the runway centre line, between the runway edge lights is greater than 50 m.

(c) Location: Runway centre line lights shall be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at longitudinal spacing of approximately 15 m. Where the serviceability level of the runway centre line lights specified as maintenance objectives in ADR.OPS.C.015(b)(1) to (b)(3) can be demonstrated, and the runway is intended for use in runway visual range conditions of 300 m or greater, the longitudinal spacing may be approximately 30 m.

(d) Characteristics:

(1) Runway centre line lights shall be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end, except that for runways less than 1 800 m in length, the alternate red and variable white lights shall extend from the midpoint of the runway usable for landing to 300 m from the runway end.

(2) Runway centre line lights characteristics shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-10 or Figure U-11, as appropriate.

(3) Runway centre line lights chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(e) Centre line guidance for take-off from the beginning of a runway to a displaced threshold should be provided by:

(1) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off, and it does not dazzle the pilot of an aircraft taking off; or

(2) runway centre line lights; or

(3) barrettes of at least 3 m length, and spaced at uniform intervals of 30 m, as shown in

Figure CS-91, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off.

Where necessary, provision should be made to extinguish those centre line lights, as prescribed in paragraph (2) above or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case should only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

GM ADR-DSN.M.690 Runway centre line lights

Care is required in the design of the electrical system to ensure that failure of part of the electrical system will not result in a false indication of the runway distance remaining.

CS ADR-DSN.M.695 Runway touchdown zone lights

(a) Applicability: Touchdown zone lights shall be provided in the touchdown zone of a precision approach runway Category II or III.

(b) Location and positioning:

(1) Touchdown zone lights shall extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1 800 m in length, the system shall be shortened so that it does not extend beyond the midpoint of the runway.

(2) The pattern shall be formed by pairs of barrettes symmetrically located about the runway centre line. The lateral spacing between the innermost lights of a pair of barrettes shall be equal to the lateral spacing selected for the touchdown zone marking. The longitudinal spacing between pairs of barrettes shall be either 30 m or 60 m.

(c) Characteristics:

(1) A barrette shall be composed of at least three lights with spacing between the lights of not more than 1.5 m.

(2) A barrette shall be not less than 3 m or more than 4.5 m in length.

(3) Touchdown zone lights shall be fixed unidirectional lights showing variable white.

(4) Touchdown zone lights characteristics shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-9.

(5) Touchdown zone lights chromaticity shall be in accordance with the specifications in CS

ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.695 Runway touchdown zone lights

To allow for operations at lower visibility minima, it may be advisable to use a 30 m longitudinal spacing between barrettes.

CS ADR-DSN.M.696 Simple touchdown zone lights

(a) The purpose of simple touchdown zone lights is to provide pilots with enhanced situational awareness in all visibility conditions and to help enable pilots to decide whether to commence a go around if the aircraft has not landed by a certain point on the runway.

(b) Applicability: Except where touchdown zone lights are provided in accordance with CS ADR-DSN.M.695, at a runway where the approach angle is greater than 3.5 degrees and/or the Landing Distance Available combined with other factors increases the risk of an overrun, simple touchdown zone lights should be provided.

(c) Location and positioning:

(1) Simple touchdown zone lights shall be a pair of lights located on each side of the runway centre line 0.3 metres beyond the upwind edge of the final touchdown zone marking.

(2) The lateral spacing between the inner lights of the two pairs of lights shall be equal to the lateral spacing selected for the touchdown zone marking.

(3) The spacing between the lights of the same pair shall not be more than 1.5 m or half the width of the touchdown zone marking, whichever is greater (see Figure CS-92).

(4) Where provided on a runway without touchdown zone markings, simple touchdown zone lights should be installed in such a position that provides the equivalent touchdown zone information.

(d) Characteristics:

(1) Simple touchdown zone lights shall be fixed unidirectional lights showing variable white and aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach to the runway.

(2) Simple touchdown zone lights characteristics shall be in accordance with the

specifications in CS ADR-DSN.U.940, Figure U-9.

(3) Simple touchdown zone lights chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

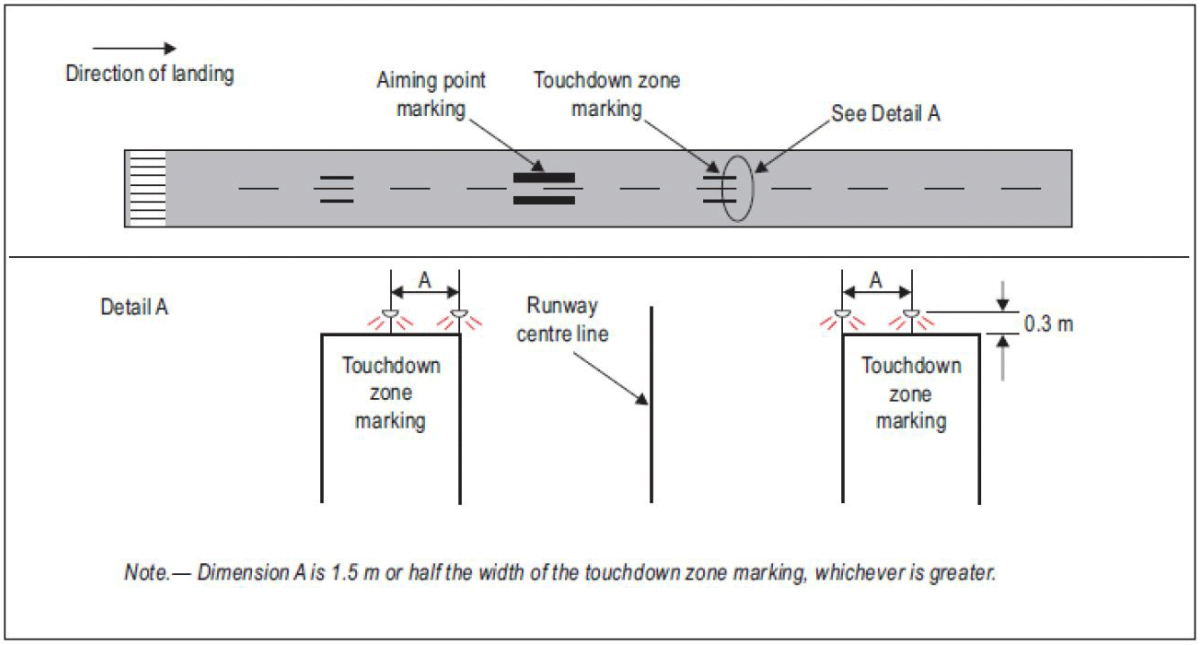


Figure CS-93: Simple touchdown zone lighting

GM1 ADR-DSN.M.696 Simple touchdown zone lights

Simple touchdown zone lights should be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

CS ADR-DSN.M.700 Rapid exit taxiway indicator lights (RETILs)

(a) The purpose of rapid exit taxiway indicator lights (RETILs) is to provide pilots with distance-to-go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions and enable pilots to apply braking action for more efficient roll-out and runway exit speeds. It is essential that pilots operating at aerodromes with runway(s) displaying rapid exit taxiway indicator lights be familiar with the purpose of these lights.

(b) Applicability: Rapid exit taxiway indicator lights should be provided on a runway intended for use in Runway Visual Range conditions less than a value of 300 m and/or where the traffic density is Heavy.

(c) Location:

(1) A set of RETILs shall be located on the runway on the same side of the runway centre line as the associated rapid exit taxiway. In each set the lights shall be located 2 m apart and the light nearest to the runway centre line shall be displaced 2 m from the runway centre line.

(2) Where more than one rapid exit taxiway exists on a runway, the set of RETILs for each exit shall not overlap when displayed.

(d) Characteristics:

(1) RETILs shall be fixed lights and comprise a set of yellow unidirectional lights installed in the runway adjacent to the centre line. The lights are positioned in a 3-2-1 sequence at 100 m intervals prior to the point of tangency of the rapid exit taxiway centre line.

(2) RETILs shall be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

(3) Rapid exit taxiway indicator lights shall not be displayed in the event of any lamp failure or other failure that prevents the display of the light pattern depicted in Figure CS-94.

(4) RETILs' characteristics shall be in accordance with the specifications in CS ADR- DSN.U.940, Figure U-10 or U-11, as appropriate.

(5) RETILs' chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.700 Rapid exit taxiway indicator lights (RETILs)

(a) In low visibility conditions, rapid exit taxiway indicator lights provide useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line.

(b) Following a landing, runway occupancy time has a significant effect on the achievable runway capacity. Rapid exit taxiway indicator lights allow pilots to maintain a good roll-out speed until it is necessary to decelerate to an appropriate speed for the turn into a rapid exit turn-off. A roll-out speed of 60 kt until the first RETIL (three-light barrette) is reached is seen as the optimum.

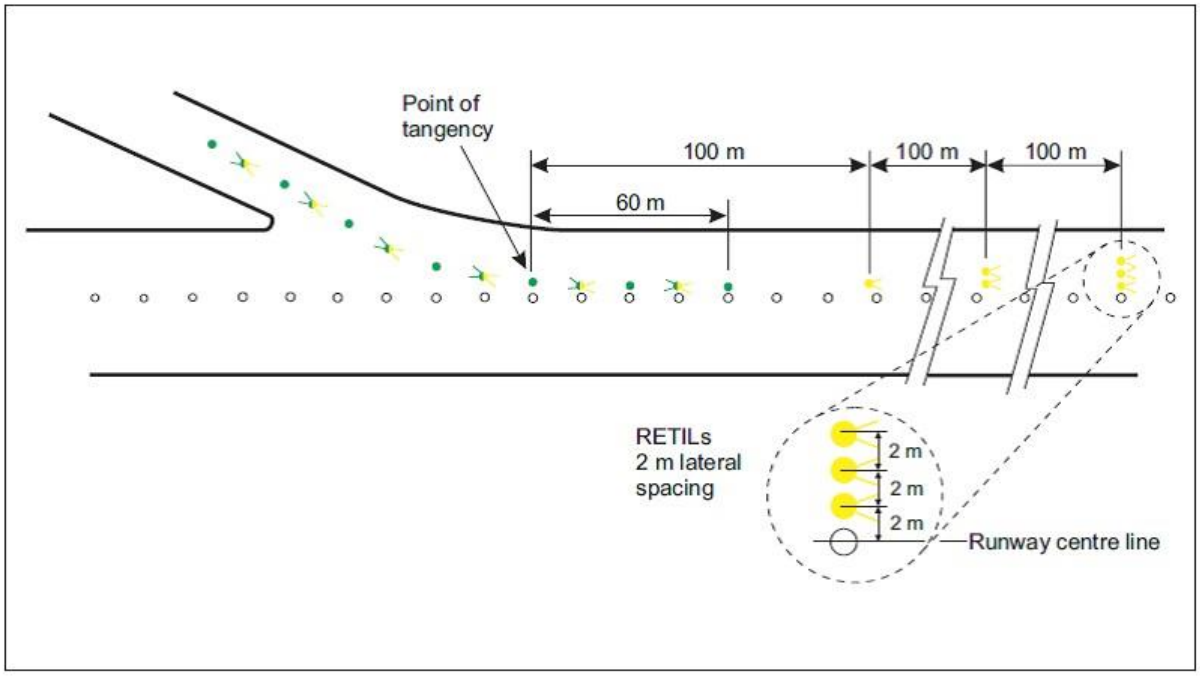


Figure CS-95: Rapid exit taxiway indicator lights (RETILs)

CS ADR-DSN.M.705 Stopway lights

(a) Applicability: Stopway lights shall be provided for a stopway intended for use at night.

(b) Location:

(1) Stopway lights shall be placed along the full length of the stopway and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights.

(2) Stopway lights shall be provided across the end of the stopway on a line at right angle to the stopway axis as near to the end of the stopway as possible and in any case not more than 3m outside the end

(c) Characteristics:

(1) Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.

(2) Stopway lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.706 Runway status lights (RWSL)

(a) Applicability:

(1) The inclusion of detailed specification for RWSL is not intended to imply that RWSL have to be provided at an aerodrome.

(2) RWSL is a type of autonomous runway incursion warning system (see CS ADR-DSN.T.921), consisting of two basic visual components: Runway Entrance Lights (RELs) and Take-off Hold Lights (THLs). The two components can be installed individually, but are designed to complement each other.

(b) Location:

(1) Where provided, RELs shall be offset 0.6 m from the taxiway centre line on the opposite side to the taxiway centre line lights and begin 0.6 m before the runway-holding position extending to the edge of the runway. An additional single light should be placed on the runway 0.6 m from the runway centre line and aligned with the last two taxiway RELs.

(2) RELs shall consist of at least five light units and shall be spaced at a minimum of 3.8 m and a maximum of 15.2 m longitudinally, depending upon the taxiway length involved, except for a single light installed near the runway centre line.

(3) Where provided, THLs shall be offset 1.8 m on each side of the runway centre line lights and extend, in pairs, starting at a point 115 m from the beginning of the runway and, thereafter, every 30 m for at least 450 m.

(c) Characteristics:

(1) Where provided, RELs shall consist of a single line of fixed in pavement lights showing red in the direction of aircraft approaching the runway.

(2) RELs shall illuminate as an array at each taxiway/runway intersection where they are installed less than two seconds after the system determines that a warning is needed.

(3) RELs intensity and beam spread shall be in accordance with the specifications of Chapter U, Figures U-16 and U-18.

(4) Where provided, THLs shall consist of two rows of fixed in pavement lights showing red facing the aircraft taking off.

(5) THLs shall illuminate as an array on the runway less than two seconds after the system determines that a warning is needed.

(6) THLs intensity and beam spread shall be in accordance with the specifications of Chapter U, Figure U-29.

(7) RELs and THLs should be automated to the extent that the only control over each system will be to disable one or both systems.

GM1 ADR-DSN.M.706 Runway status lights (RWSL)

(a) Where two or more runway-holding positions are provided, the runway-holding position referred is that closest to the runway.

(b) Additional take-off hold lights (THLs) may be similarly provided at the starting point of the take- off roll.

(c) Consideration for reduced beam width may be required for some runway entrance lights (RELs) lights at acute-angled runway/taxiway intersections to ensure the RELs are not visible to aircraft on the runway.

CS ADR-DSN.M.710 Taxiway centre line lights

(a) The safety objective of taxiway centre line lights is to provide guidance for the safe taxi of aircraft as described in paragraph (b).

(b) Applicability:

(1) Taxiway centre line lights shall be provided on an exit taxiway, taxiway, and apron intended for use in runway visual range conditions less than a value of 300 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights, and centre line marking provide adequate guidance.

(2) Taxiway centre line lights should be provided on a taxiway intended for use at night in runway visual range conditions of 300 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where taxiway edge lights, and centre line marking provide adequate guidance.

(3) Taxiway centre line lights shall be provided on an exit taxiway, taxiway, and apron in all visibility conditions where specified as components of an advanced surface movement

guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

(4) Taxiway centre line lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 300 m, except that these lights need not be provided where the traffic density is light and taxiway edge lights, and centre line marking provide adequate guidance.

(5) Taxiway centre line lights shall be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

(6) Where a runway forming part of a standard taxi route is provided with runway lighting and taxiway lighting, the lighting systems should be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

(c) Characteristics:

(1) Except as provided for in paragraph (c)(3) below, taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route shall be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on, or in the vicinity of the taxiway.

(2) Taxiway centre line lights on an exit taxiway shall be fixed lights. Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area, or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green, as shown in Figure CS-96. The first light in the exit centre line shall always show green and the light nearest to the perimeter shall always show yellow.

(3) Where necessary to denote the proximity to a runway, taxiway centre line lights should be fixed lights showing alternating green and yellow from the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway, to the runway and continue alternating green and yellow until:

(i) their end point near the runway centre line; or

(ii) in the case of the taxiway centre line lights crossing the runway, to the opposite

perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway.

(4) Taxiway centre line lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-16, U-17, or U-18, as appropriate, for taxiways intended for use in runway visual range conditions of less than a value of 300 m; Figure U-19 or Figure U-20, as appropriate, for other taxiways.

(5) Where higher intensities are required, from an operational point of view, taxiway centre line lights on rapid exit taxiways intended for use in runway visual range conditions less than a value of 300 m shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-16. The number of levels of brilliancy settings for these lights shall be the same as that for the runway centre line lights.

(6) Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-21, U-22, or U-23, as appropriate.

(7) Taxiway centre line lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(d) Location and positioning:

(1) Taxiway centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

(2) Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways should be positioned in accordance with CS ADR-DSN.M.715.

GM1 ADR-DSN.M.710 Taxiway centre line lights

(a) In the case where taxiway centre line lights are provided and where there may be a need to delineate the edges of a taxiway, e.g. on a rapid exit taxiway, narrow taxiway, this may be done with taxiway edge lights or markers. Care is necessary to limit the light distribution of green lights on or near a runway so as to avoid possible confusion with threshold lights.

(b) Care should be taken to limit the light distribution of green lights on or near a runway so as to avoid possible confusion with threshold lights.

(c) The provisions of CS ADR-DSN.M.710(c)(3) can form part of effective runway incursion prevention measures.

(d) High-intensity centre line lights should only be used in case of an absolute necessity and following a specific study.

(e) The size of the ILS/MLS critical/sensitive area depends on the characteristics of the associated ILS/MLS and other factors. Guidance is provided in Annex 10, Volume I, Attachments C and G.

CS ADR-DSN.M.715 Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways

(a) The safety objective of taxiway centre line lights is to provide guidance for the safe taxi of aircraft as described in paragraph (b).

(b) Taxiway centre line lights on taxiways:

(1) Taxiway centre line lights on a straight section of a taxiway shall be spaced at longitudinal intervals of not more than 30 m, except that:

(i) intervals less than 30 m shall be provided on short straight sections; and

(ii) on a taxiway intended for use in RVR conditions of less than a value of 300m, the longitudinal spacing shall not exceed 15 m.

(iii) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing.

(2) Taxiway centre line lights on a taxiway curve shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights shall be spaced at intervals such that a clear indication of the curve is provided.

(3) On a taxiway intended for use in RVR conditions of less than a value of 300 m, the lights on a curve shall not exceed a spacing of 15 m and on a curve of less than 400 m radius the lights shall be spaced at intervals of not greater than 7.5 m. This spacing shall extend for 60 m before and after the curve.

(4) On a taxiway curve the spacing of taxiway centre line lights should be as specified in the Table CS-56.

RVR	Radius of taxiway	Taxiway centre line lights spacing on taxiway curves
< 300 m	< 400 m	Not greater than7.5 m. This spacing should extend for 60 m before and after the curve.
	> 400 m	Not greater than 15 m
> 300 m	< 400 m	Not greater than 7.5 m
	401 m to 899 m	Not greater than 15 m
	> 900 m	Not greater than 30 m

Table CS-57: Taxiway centre line lights spacing on taxiway curves

(c) Taxiway centre line lights on rapid exit taxiways:

(1) Taxiway centre line lights on a rapid exit taxiway shall commence at a point at least 60 m before the beginning of the taxiway centre line curve, and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed. The lights on that portion parallel to the runway centre line shall always be at least 60 cm from any row of runway centre line lights.

(2) The lights should be spaced at longitudinal intervals of not more than 15 m. Where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

(d) Taxiway centre line lights on other exit taxiways:

(1) Taxiway centre line lights on exit taxiways other than rapid exit taxiways shall commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light shall be at least 60 cm from any row of runway centre line lights, as shown in Figure CS-97.

(2) The lights shall be spaced at longitudinal intervals of not more than 7.5 m.

(e) Taxiway centre line lights on runways:

Taxiway centre line lights on a runway forming part of a standard taxi-route, and intended for taxiing in runway visual range conditions less than a value of 300 m shall be spaced at longitudinal intervals not exceeding 15 m.

(f) Positioning of taxiway centre line lights on taxiway:

The spacing on a particular section of taxiway centre line lighting (straight or curved section) should be such that a clear indication of the taxiway centre line is provided, particularly on a curved section.

(g) Taxiway centre line lights on straight sections of taxiways:

Larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing.

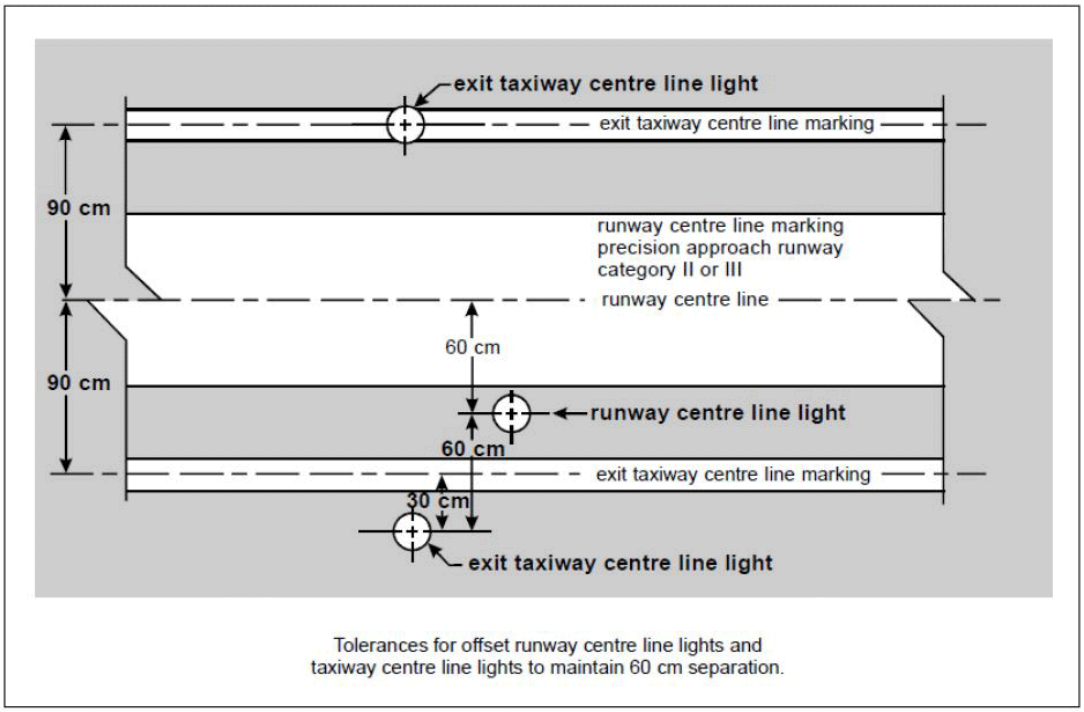


Figure CS-98: Offset runway and taxiway center line lights

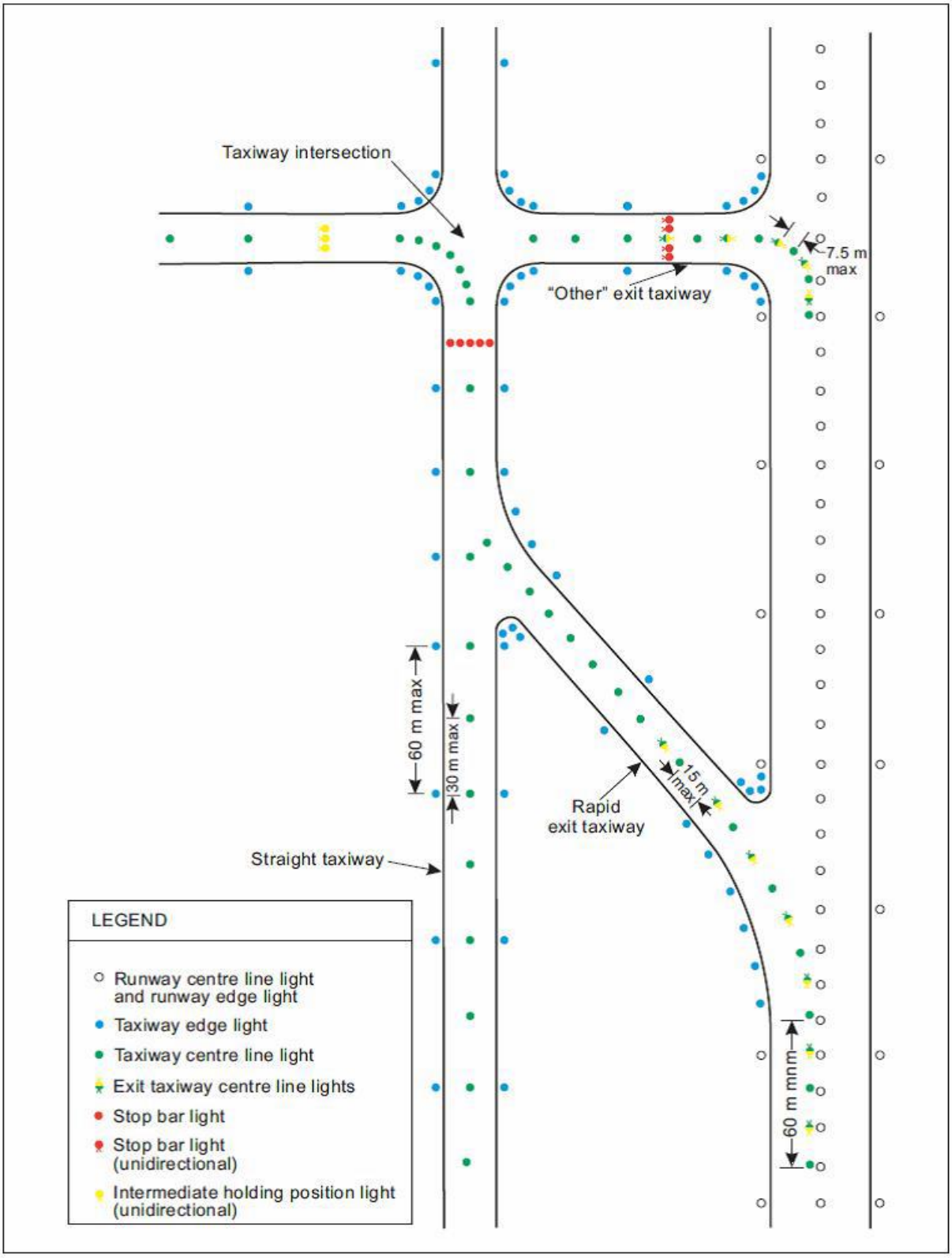


Figure CS-99: Taxiway lighting

CS ADR-DSN.M.720 taxiway edge lights

(a) Applicability:

(1) Taxiway edge lights shall be provided at the edges of a runway turn pad, holding bay, apron, etc. intended for use at night, and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means.

(2) Taxiway edge lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre line lights.

(b) Location and positioning:

(1) Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route shall be spaced at uniform longitudinal intervals of not more than 60 m. The lights on a curve shall be spaced at intervals less than 60 m so that a clear indication of the curve is provided.

(2) Taxiway edge lights on a holding bay, apron, etc. should be spaced at uniform longitudinal intervals of not more than 60 m.

(3) Taxiway edge lights on a runway turn pad shall be spaced at uniform longitudinal intervals of not more than 30 m.

(4) The lights shall be located as near as practicable to the edges of the taxiway, runway turn pad, holding bay, apron or runway, etc., or outside the edges at a distance of not more than 3 m.

(c) Characteristics:

(1) Taxiway edge lights shall be fixed lights showing blue.

(2) The lights shall show up to at least 75° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an intersection, exit, or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

(3) The intensity of taxiway edge lights shall be at least 2 cd from 0° to 6° vertical, and 0.2 cd at any vertical angles between 6° and 75°.

(4) Taxiway edge lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.720 taxiway edge lights

Guidance on the spacing of taxiway edge lights on curves is given in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.M.725 Runway turn pad lights

(a) The safety objective of runway turn pad lights is to provide additional guidance on a runway turn pad to enable an aeroplane to complete a safe 180-degree turn, and align with the runway centre line.

(b) Applicability:

(1) Runway turn pad lights shall be provided for continuous guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 300 m to enable an aeroplane to complete a 180-degree turn, and align with the runway centre line.

(2) Runway turn pad lights should be provided on a runway turn pad intended for use at night,

(c) Location:

(1) Runway turn pad lights should normally be located on the runway turn pad marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

(2) Runway turn pad lights on a straight section of the runway turn pad marking shall be spaced at longitudinal intervals of not more than 15 m.

(3) Runway turn pad lights on a curved section of the runway turn pad marking shall not exceed a spacing of 7.5 m.

(d) Characteristics:

(1) Runway turn pad lights shall be unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the

runway turn pad.

(2) Runway turn pad lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-17 or Figure U-18, as appropriate.

(3) Runway turn pad lights chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.730 Stop bars

(a) Applicability:

(1) A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550 m, except where:

(i) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or

(ii) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:

(A) aircraft on the manoeuvring area to one at a time; and

(B) vehicles on the manoeuvring area to the essential minimum.

(2) Where there is more than one stop bar associated with a taxiway/runway intersection, only one shall be illuminated at any given time.

(3) A stop bar shall be provided at an intermediate holding position when it is part of a surface movement guidance and control system to provide traffic control by visual means.

(b) Location: Stop bars shall be located across the taxiway at the point where it is desired that traffic stop. Where additional lights as specified in (c) 6 are provided, these lights shall be located not less than 3m from the taxiway edge.

(c) Characteristics:

(1) Stop bars shall consist of lights spaced at uniform intervals of not more than 3 m across the taxiway, showing red in the intended direction(s) of approach to the intersection or runway-holding position.

(2) Stop bars installed at a runway-holding position shall be unidirectional, and shall show red in the direction of approach to the runway.

(3) The intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-16 to U-20, as appropriate.

(4) Where stop bars are specified as components of an advanced surface movement guidance and control system, and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-21, U-22 or U-23, as appropriate.

(5) Where a wide beam fixture is required, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U- 21 or Figure U-23, as appropriate.

(6) A pair of elevated lights should be added to each end of the stop bar where the in-pavement stop bar lights might be obscured from a pilot's view, where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.

(7) Where the additional lights specified in (6) above are provided, these lights shall have the same characteristics as the lights in the stop bar but shall be visible to approaching aircraft up to the stop bar position.

(8) The lighting circuit shall be designed so that:

(i) stop bars located across entrance taxiways are selectively switchable;

(ii) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;

(iii) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar shall be extinguished for a distance of at least 90 m; and

(iv) stop bars are interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated, the stop bar is extinguished and vice versa.

(9) Stop bar lights chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.730 Stop bars

(a) A stop bar is intended to be controlled either manually or automatically by air traffic services.

(b) Runway incursions may take place in all visibility or weather conditions. The provision of stop bars at runway-holding positions and their use at night and in visibility conditions greater than 550 m runway visual range can form part of effective runway incursion prevention measures.

(c) Where necessary, to enhance conspicuity of an existing stop bar, extra lights are installed uniformly.

(d) High-intensity stop bars should only be used in case of an absolute necessity and following a specific study.

(e) Care is required in the design of the electrical system to ensure that all of the lights of a stop bar will not fail at the same time. Guidance on this issue is given in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

CS ADR-DSN.M.735 Intermediate holding position lights

(a) Applicability: Except where a stop bar has been installed, intermediate holding position lights shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 300 m.

Intermediate holding position lights shall be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar.

(b) Location: Intermediate holding position lights shall be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking.

(c) Characteristics of intermediate holding position lights:

(1) Intermediate holding position lights shall consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights if provided.

(2) The lights shall be disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5 m apart.

(3) Intermediate holding position lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and in Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.745 Runway guard lights

(a) The safety objective of the runway guard lights is to warn pilots and drivers of vehicles, when operating on taxiways, that they are about to enter a runway. There are two standard configurations of runway guard lights as illustrated in Figure CS-100.

(b) Applicability:

(1) Runway guard lights, Configuration A, shall be provided at each taxiway/runway intersection associated with a runway intended for use in:

(i) runway visual range conditions less than a value of 550 m where a stop bar is not installed; and

(ii) runway visual range conditions of values between 550 m and 1 200 m where the traffic density is heavy.

(2) As part of runway incursion prevention measures, runway guard lights, Configuration A or B, shall be provided at each taxiway/runway intersection where runway incursion hot spots have been identified, and used under all weather conditions during day and night.

(3) Configuration B runway guard lights shall not be collocated with a stop bar.

(4) Where more than one runway-holding position exists at a runway/taxiway intersection, only the set of runway guard lights associated with the operational runway-holding position shall be illuminated.

(c) Location:

(1) Runway guard lights, Configuration A, shall be located at each side of the taxiway on the holding side of the runway-holding position marking.

(2) Runway guard lights, Configuration B, shall be located across the taxiway on the holding side of the runway holding position marking.

(d) Characteristics:

(1) Runway guard lights, Configuration A, shall consist of two pairs of yellow lights.

(2) Runway guard lights, Configuration B, shall consist of yellow lights spaced at intervals of 3 m across the taxiway.

(3) Where there is a need to enhance the contrast between the on- and off-state of runway guard lights, Configuration A, intended for use during the day, a visor of sufficient size to prevent sunlight from entering the lens without interfering with the function of the fixture shall be located above each lamp. Some other device or design, e.g. special designed optics, may be used in lieu of the visor.

(4) The light beam shall be unidirectional and shall show yellow in the direction of approach to the runway-holding position.

(5) The intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-27.

(6) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

(7) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

(8) The intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

(9) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-24.

(10) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-24.

(11) The lights in each unit of Configuration A shall be illuminated alternately.

(12) For Configuration B, adjacent lights shall be alternately illuminated and alternative lights

shall be illuminated in unison.

(13) The lights shall be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods shall be equal and opposite in each light.

(14) Runway guard lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

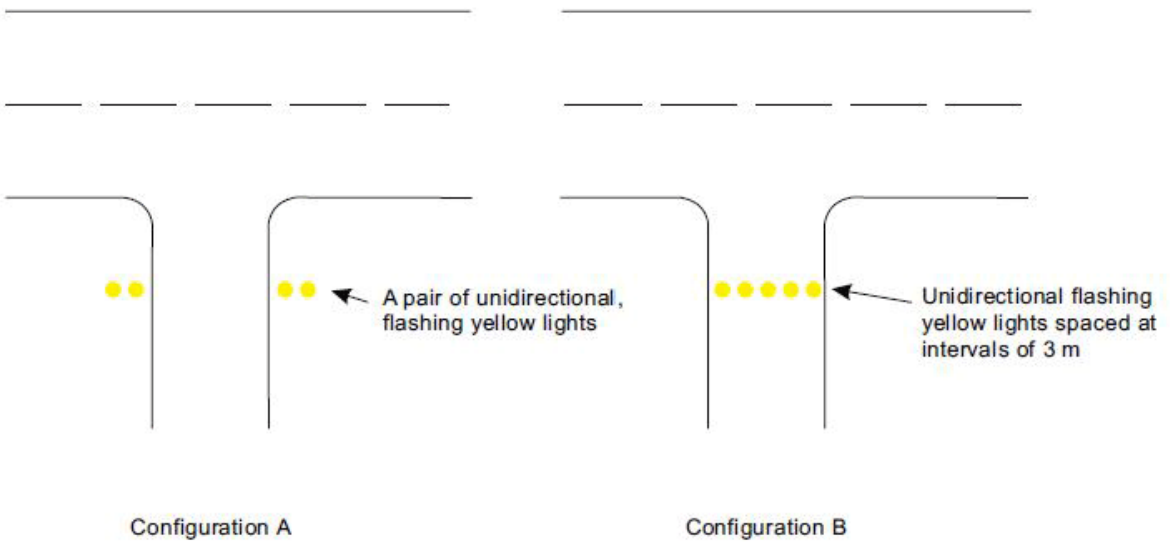


Figure CS-101: Runway guard lights

GM1 ADR-DSN.M.745 Runway guard lights

Runway incursions may take place in all visibility or weather conditions. The use of runway guard lights at runway-holding positions can form part of effective runway incursion prevention measures.

(a) Where taxiways are substantially wider than those specified in CS ADR-DSN.D.245, such as wide-throat taxiways, the lights in Configuration A, located at each of the sides, are likely to be missed by pilots and may be necessary to be supplemented by a row of lights (inset) located across the taxiway, Configuration B.

(b) Higher light intensities may be required to maintain ground movement at a certain speed in low visibilities.

(c) The optimum flash rate is dependent on the rise and fall times of the lamps used. Runway guard

lights, Configuration A, installed on 6.6 ampere series circuits have been found to look best when operated at 45 to 50 flashes per minute per lamp. Runway guard lights, Configuration B, installed on 6.6 ampere series circuits have been found to look best when operated at 30 to 32 flashes per minute per lamp.

(d) Additional guidance on runway guard lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(e) Runway guard lights, Configuration B, may supplement runway guard lights, Configuration A, when deemed necessary.

(f) Some other device or design, e.g. specially designed optics, may be used in lieu of the visor.

CS ADR-DSN.M.750 Apron floodlighting

(a) The purpose of apron floodlighting is to facilitate safe operations on an apron, on a designated isolated aircraft parking position intended to be used at night.

(b) Applicability: Apron floodlighting shall be provided on an apron and as necessary on a designated isolated aircraft parking position intended to be used at night.

(c) Location: Apron floodlights shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimise shadows.

(d) Characteristics:

(1) The spectral distribution of apron floodlights shall be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.

(2) The average illuminance shall be at least the following:

(i) Aircraft stand:

(A) horizontal illuminance — 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

(B) vertical illuminance — 20 lux at a height of 2 m above the apron in relevant

directions.

(ii) Other apron areas: horizontal illuminance — 50 % of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

GM1 ADR-DSN.M.750 Apron floodlighting

Additional guidance on apron floodlighting is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

CS ADR-DSN.M.755 Visual docking guidance system

(a) Applicability: A visual docking guidance system shall be provided when it is intended to indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshallers, are not practicable.

(b) Characteristics:

(1) The system shall provide both azimuth and stopping guidance.

(2) The azimuth guidance unit and the stopping position indicator shall be adequate for use in all weather, visibility, background lighting, and pavement conditions for which the system is intended both by day and night but shall not dazzle the pilot.

(3) The azimuth guidance unit and the stopping position indicator shall be of a design such that:

(i) a clear indication of malfunction of either or both is available to the pilot; and

(ii) they can be turned off.

(4) The accuracy of the system shall be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

(5) The azimuth guidance unit and the stopping position indicator shall be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights if present, and the visual docking guidance system.

(6) The system should be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

(7) If selective operation is required to prepare the system for use by a particular type of aircraft, then the system shall provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

(c) Location:

(1) The azimuth guidance unit shall be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking manoeuvre, and aligned for use by the pilot occupying the left seat,

(2) The azimuth guidance unit and the stopping position indicator shall be positioned as prescribed below.

(i) The azimuth guidance unit shall provide unambiguous left/right guidance which enables the pilot to acquire and maintain the lead-in line without over-controlling.

(ii) When azimuth guidance is indicated by colour change, green shall be used to identify the centre line and red for deviations from the centre line.

(iii) The stopping position indicator shall be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning their head.

(iv) The stopping position indicator shall be usable at least by the pilot occupying the left seat, although it is preferable for it to be usable by the pilots occupying both the left and right seats.

(v) The stopping position information provided by the indicator for a particular aircraft type shall account for the anticipated range of variations in pilot eye height and/or viewing angle.

(vi) The stopping position indicator shall show the stopping position for the aircraft for which guidance is being provided and shall provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position.

(vii) The stopping position indicator shall provide closing rate information over a

distance of at least 10 m.

(viii) When stopping guidance is indicated by colour change, green shall be used to show that the aircraft can proceed and red to show that the stop point has been reached, except that for a short distance prior to the stop point a third colour may be used to warn that the stopping point is close.

GM1 ADR-DSN.M.755 Visual docking guidance system

(a) The azimuth guidance unit shall be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit for use by the pilots occupying both the left and right seats.

(b) The factors to be considered in evaluating the need for a visual docking guidance system are in particular: the number and type(s) of aircraft using the aircraft stand, weather conditions, space available on the apron, and the precision required for manoeuvring into the parking position due to aircraft servicing installation, passenger loading bridges, etc.

(c) Care is required in both the design and on-site installation of the system to ensure that reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

(d) See Aerodrome Design Manual (Doc 9157), Part 4 — Visual Aids provides guidance on the selection of suitable systems.

CS ADR-DSN.M.760 Advanced visual docking guidance system

(a) Applicability

(1) Advanced visual docking guidance system (A-VDGS) should be provided where it is operationally desirable to confirm the correct aircraft type for which guidance is being provided, and/or to indicate the stand centre line in use, where more than one is provided for:

(2) The Advanced visual docking guidance system shall be suitable for use by all types of aircraft for which the aircraft stand is intended.

(3) The Advanced visual docking guidance system shall only be used in conditions in which its operational performance is specified.

(4) The docking guidance information provided by an advanced visual docking guidance system shall not conflict with that provided by a conventional visual docking guidance

system on an aircraft stand if both types are provided, and are in operational use. A method of indicating that the system is not in operational use or unserviceable should be provided.

(b) Location

The Advanced visual docking guidance system shall be located such that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking manoeuvre.

(c) Characteristics

(1) The Advanced visual docking guidance system shall provide, at minimum, the following guidance information at the appropriate stage of the docking manoeuvre:

(i) an emergency stop indication;

(ii) the aircraft type and model for which the guidance is provided;

(iii) an indication of the lateral displacement of the aircraft relative to the stand centre line;

(iv) the direction of azimuth correction needed to correct a displacement from the stand centre line;

(v) an indication of the distance to the stop position;

(vi) an indication when the aircraft has reached the correct stopping position; and

(vii) a warning indication if the aircraft goes beyond the appropriate stop position.

(2) The Advanced visual docking guidance system shall be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking manoeuvre.

(3) The time taken from the determination of the lateral displacement to its display shall not result in a deviation of the aircraft when operated in normal conditions, from the stand centre line greater than 1 m.

(4) The information on displacement of the aircraft relative to the stand centre line and distance to the stopping position, when displayed, should be provided with the accuracy

specified in Table CS-50. Symbols and graphics used to depict guidance information should be intuitively representative of the type of information provided.

(i) Information on the lateral displacement of the aircraft relative to the stand centre line should be provided at least 25 m prior to the stop position.

(ii) Continuous closure distance and closure rate shall be provided from at least 15 m prior to the stop position.

(iii) Where provided, closure distance displayed in numerals should be provided in metre integers to the stop position and displayed to 1 decimal place at least 3 m prior to the stop position.

(iv) Throughout the docking manoeuvre, an appropriate means shall be provided on the Advanced visual docking guidance system to indicate the need to bring the aircraft to an immediate halt. In such an event which includes a failure of the system, no other information shall be displayed.

(v) Provision to initiate an immediate halt to the docking procedure shall be made available to personnel responsible for the operational safety of the stand.

(vi) The word 'STOP' in red characters should be displayed when an immediate cessation of the docking manoeuvre is required.

Guidance information	Maximum deviation at stop position (stop area)	Maximum deviation at 9 m from stop position	Maximum deviation at 15 m from stop position	Maximum deviation at 25 m from stop position
Azimuth	±250 mm	±340 mm	±400 mm	±500 mm
Distance	±500 mm	±1 000 mm	±1 300 mm	Not specified

Table CS-58: A-VDGS recommended displacement accuracy

GM1 ADR-DSN.M.760 Advanced visual docking guidance system

(a) Advanced visual docking guidance systems should include those systems that, in addition to basic and passive azimuth, and stop position information, provide pilots with active (usually sensor-based) guidance information, such as aircraft type indication, distance-to-go

information, and closing speed. Docking guidance information is usually provided in a single display unit.

(b) The use of the Advanced visual docking guidance systems in conditions such as weather, visibility, and background lighting both by day and night would need to be specified.

(c) Care is required in both the design and on-site installation of the system to ensure that glare, reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

(d) The use of colour needs to be appropriate and should follow signal convention, i.e. red, yellow and green mean hazard, caution and normal/correct conditions respectively. The effects of colour contrasts also need to be considered.

(e) The indication of the distance of the aircraft from the stop position may be colour-coded and presented at a rate and distance proportional to the actual closure rate, and distance of the aircraft approaching the stop point.

(f) An A-VDGS may provide docking guidance information in three stages: the acquisition of the aircraft by the system, the azimuth alignment of the aircraft, and the stopping position information.

(g) Aerodrome Design Manual (Doc 9157), Part 4, for an indication of the maximum aircraft speeds relative to distance to the stopping position.

(h) Usually the pilot-in-command is responsible for the docking of the aircraft. However, in some circumstances, another person could be responsible and this person may be the driver of a vehicle that is towing the aircraft.

CS ADR-DSN.M.765 Aircraft stand manoeuvring guidance lights

(a) Aircraft stand manoeuvring guidance lights shall be provided to facilitate the positioning of an aircraft on an aircraft stand or on a paved apron intended for use in poor visibility conditions, unless adequate guidance is provided by other means.

(b) Location: Aircraft stand manoeuvring guidance lights shall be collocated with the aircraft stand markings.

(c) Characteristics:

(1) Aircraft stand manoeuvring guidance lights, other than those indicating a stop position,

shall be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

(2) The lights used to delineate lead-in, turning, and lead-out lines should be spaced at intervals of not more than 7.5 m on curves and 15 m on straight sections.

(3) The lights indicating a stop position shall be fixed, unidirectional lights showing red.

(4) The intensity of the lights shall be adequate for the condition of visibility and ambient light in which the use of the aircraft stand is intended.

(5) The lighting circuit should be designed so that the lights may be switched on to indicate that an aircraft stand is to be used, and switched off to indicate that it is not to be used.

CS ADR-DSN.M.770 Road-holding position light

(a) Applicability: A road-holding position light shall be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550 m.

(b) Location: A road-holding position light shall be located adjacent to the holding position marking 1.5 m (±0.5 m) from one edge of the road, i.e. left or right as appropriate to the local road traffic regulations.

(c) Characteristics:

(1) The road-holding position light shall comprise:

(i) a controllable red (stop)/green (go) traffic light; or

(ii) a flashing-red light.

(2) The road-holding position light beam shall be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.

(3) The intensity of the light beam shall be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended but shall not dazzle the driver.

(4) The flash frequency of the flashing red light shall be between 30 and 60 flashes per minute.

GM1 ADR-DSN.M770 Road-holding position light

Where a road intersects a taxiway where operationally required, a suitable holding position light may be located adjacent to the roadway/taxiway intersection marking 1.5 m (±0.5 m) from one edge of the road, i.e. left or right as appropriate to the local road traffic regulations.

CS ADR-DSN.M.771 No-entry bar

(a) Applicability: A no-entry bar should be provided across a taxiway which is intended to be used as an exit only taxiway. The purpose of a no-entry bar is to assist in preventing inadvertent access of traffic to that taxiway.

(b) Location:

(1) A no-entry bar should be located across the taxiway at the end of an exit only taxiway where it is desired to prevent traffic from entering the taxiway in the wrong direction.

(2) A no-entry bar should be collocated with a no-entry sign and/or a no-entry marking.

(c) Characteristics:

(1) A no-entry bar shall consist of unidirectional lights spaced at uniform intervals of no more than 3 m showing red in the intended direction(s) of approach to the runway.

(2) A pair of elevated lights should be added to each end of the no-entry bar where the in-pavement no-entry bar lights might be obscured from a pilot's view, for example, by sand or rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.

(3) Where no-entry bars are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of no-entry bar lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-21, U-22 or U-23, as appropriate.

(4) Where a wide beam fixture is required, the intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-21 or U-23, as appropriate.

(5) Taxiway centre line lights installed beyond the no-entry bar, looking in the direction of

the runway, shall not be visible when viewed from the taxiway.

(6) The intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-16 to U-20, as appropriate.

(7) No-entry bar lights chromaticity shall be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

GM1 ADR-DSN.M.771 No-entry bar

(a) Runway incursions may take place in all visibility or weather conditions. The use of no-entry bars can form part of effective runway incursion prevention measures.

(b) Where necessary to enhance conspicuity, extra lights should be installed uniformly.

(c) High-intensity no-entry bars are typically used only in case of an absolute necessity and following a safety assessment.

(d) Care is required in the design of the electrical system to ensure that all of the lights of a no-entry bar will not fail at the same time. No-entry bar lights should be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

GM1 ADR-DSN.M.773 – Combined notes for AGL mentioned in Chapter M

Combined Notes : These notes should be read in conjunction with the appropriate requirements as referred in CAR AGA ,Part AGA.

Type of lighting	Type of Runway								
	Approach runway day and night					Night	Take-off runway		Notes
	Cat III	Cat II	Cat I	Non-precision	Non-Instrument		<400 RVR	>400 RVR	
Aerodrome Beacon						O			
Identification Beacon						O			
Lighting of WDI						R			
APPROACH LIGHTS									
Simple				PP[1]	PP[1,2]	PP[1, 2]			
CAT I			PP						
CAT II		R							
CAT III	R								
RUNWAY									
VASI	O	O	O	O	O				3
Circling Guidance	O	O	O	O	O				
Lead in Lighting	O	O	O	O	O				
Runway threshold identification lights	O	O	O	O					
Edge	R	R	R			R	R	R[4]	
Threshold	R	R	R	0		R[5]			4
Wing Bar	O	O	O	R[6]	R[6]	R[6]			
End	R[6a]	R[6a]	R[6a]			R[6a]	R[6a]	R[6a]	
Centre line	R	R	R[7]				R	R[7]	
Touchdown zone	R	R							
Simple Touchdown zone			R[8]	R[8]	R[9]				
Rapid exit taxiway	R[9]	R[9]	R[9]	R[9]	R[9]	R[9]			
Stopway						R	R[11]		
Turn pad	R					R			
TAXIWAY									
Centre line						R[11, 12,10,13]	R[10, 12]		13
Edge						R[14, 15]			
Stop bars	R[16a]	R[16a]							
Intermediate	R[17]								
Runway guard	R	R	R[19]	R[19]	R[19]		R[19]	R[19]	
Apron floodlighting						R			
Stand manoeuvring	R[20]								
Road holding	R	R							
No entry	R	R	R	R	R		R	R	

R = Required PP = Where physically practicable O = Where operationally necessary

1. Except when runway used in good visibility or sufficient guidance is provided by other visual aids.	13. Required on all taxiways where component of an Advanced Surface Movement Guidance System.

2. Code 3 and 4 only. 3. Required when used for turbojet operations or aircraft with similar approach guidance requirements. 4. Provided where RVR below 800 m by day. 5. Except where threshold is displaced. 6. Where threshold is displaced and RWY Threshold lights not provided. 6a Runway Equipped with RWY edge light 7. Required where landing or take-off of high speed aircraft or runway width greater than 50 m. 8. Approach angle greater than 3.5 deg or limited LDA. 9. Where traffic density is heavy. 10. Except where traffic density is light and edge lights and centre line markings provided. 11. RVR >300 m. 12. RVR < 300 m.	14. Except where guidance can be achieved by surface illumination or other means. 15. Required on runway forming part of standard taxi route and no taxiway centre lights provided. 16. Required at intermediate hold position when part of Surface Movement Guidance System. 16a RVR <550m. 17. Except where stop bar installed. 18. At all intermediate hold positions where no need for stop and go signals provided by stop bar. 19. Where a stop bar is not installed, traffic density is heavy and/or where runway incursion hotspots have been identified. 20. RVR < 200 m.

Table CS-59

CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

CS ADR-DSN.N.775 General

(a) Signs shall be either fixed message signs or variable message signs.

(1) Applicability: Signs shall be provided to convey a mandatory instruction, information on a specific location, or destination on a movement area or to provide other information necessary for the implementation of surface movement guidance and control system (SMGCS) at an aerodrome.

(2) A variable message sign should be provided where:

(i) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

(ii) there is a need for variable predetermined information to be displayed on the sign to meet the requirements of the implementation of surface movement guidance and control system (SMGCS) at an aerodrome.

(b) Characteristics:

(1) Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table CS-60.

(2) Signs shall be rectangular, as shown in Figure CS-102 and Figure CS-103 with the longer side horizontal.

(3) Signs shall be illuminated when intended for use:

(i) in runway visual range conditions less than a value of 800 m; or

(ii) at night in association with instrument runways; or

(iii) at night in association with non-instrument runways where the code number is 3 or 4.

(4) Signs shall be retroreflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

(5) Where variable pre-determined information is required, a variable sign shall be provided.

(i) A variable message sign shall show a blank face when not in use.

(ii) In case of failure, a variable message sign shall not provide information that could lead to unsafe action from a pilot or a vehicle driver.

(iii) The time interval to change from one message to another on a variable message sign should be as short as practicable and shall not exceed 5 seconds.

(6) The taxiing guidance signs shall be in accordance with the specifications of paragraphs (c)(8) to (c)(22).

(7) The location distance for taxiing guidance signs including runway exit signs shall confirm to Table CS-61.

(8) Inscription heights shall conform to the Table CS-62.

Sign height (mm)				Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
Runway code number	Legend	Face (min)	Installed (max)		
1 or 2	200	300	700	5–11 m	3–10 m
1 or 2	300	450	900	5–11 m	3–10 m
3 or 4	300	450	900	11–21 m	8–15 m
3 or 4	400	600	1 100	11–21 m	8–15 m

Table CS-63: Location distances for taxiing guidance signs including runway exit signs

Note: defined taxiway or runway pavement edge means: the edge of the defined taxiway or runway as marked i.e. this does not include the shoulders.

Runway code number	Minimum character height		
	Mandatory instruction sign	Information sign	
		Runway exit and runway vacated signs	Other signs
1 or 2	300 mm	300 mm	200 mm

3 or 4	400 mm	400 mm	300 mm

Table CS-64: Minimum character height

(9) Where a taxiway location sign is installed in conjunction with a runway designation sign (see CS ADR-DSN.N.785(b)(9)), the character size shall be that specified for mandatory instruction signs.

(10) The dimensions shall be as follows for:

(i) Arrow:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

Table CS-65:Arrow dimensions

(ii) Stroke:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

Table CS-66:Stroke dimension

(11) Sign luminance shall be as follows:

(i) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance shall be at least:

Red	30 cd/m2
Yellow	150 cd/m2

White	300 cd/m2

TableCS-67: Average sign luminance(1)

(ii) Where operations are conducted with Instrument Runways at night or with non-Instrument Runways at night average sign luminance shall be at least:

Red	10 cd/m2
Yellow	50 cd/m2
White	100 cd/m2

Table CS-68: Average sign luminance(2)

Note: In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.

(12) The luminance ratio between red and white elements of a mandatory instruction sign shall be between 1:5 and 1:10.

(13) The average luminance of the sign is calculated by establishing grid points as shown in Figure CS-104, and using the luminance values measured at all grid points located within the rectangle representing the sign.

(14) The average value is the arithmetic average of the luminance values measured at all considered grid points.

(15) The ratio between luminance values of adjacent grid points shall not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points shall not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face shall not exceed 5:1.

(16) The forms of characters, i.e. letters, numbers, arrows, and symbols shall conform to those shown in Figure CS-105 to Figure CS-106. The width of characters and the space between individual characters shall be determined as indicated in Table CS-69:

(17) The face height of signs shall be as follows:

Legend height	Face height (min)

200 mm	300 mm
300 mm	450 mm
400 mm	600 mm

Table CS-70: Sign – Legend and face height

(18) The face width of signs shall be determined using Figure CS-107 except that, where a mandatory instruction sign is provided on one side of a taxiway only , due to physical impracticability, the face width shall not be less than:

(i) 1.94 m where the code number is 3 or 4; and

(ii) 1.46 m where the code number is 1 or 2.

(19) Borders:

(i) The black vertical delineator between adjacent direction signs should have a width of approximately 0.7 of the stroke width.

(ii) The yellow border on a stand-alone location sign should be approximately 0.5 stroke width.

(20) The colours of signs shall be in accordance with the appropriate specifications in

(21) If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

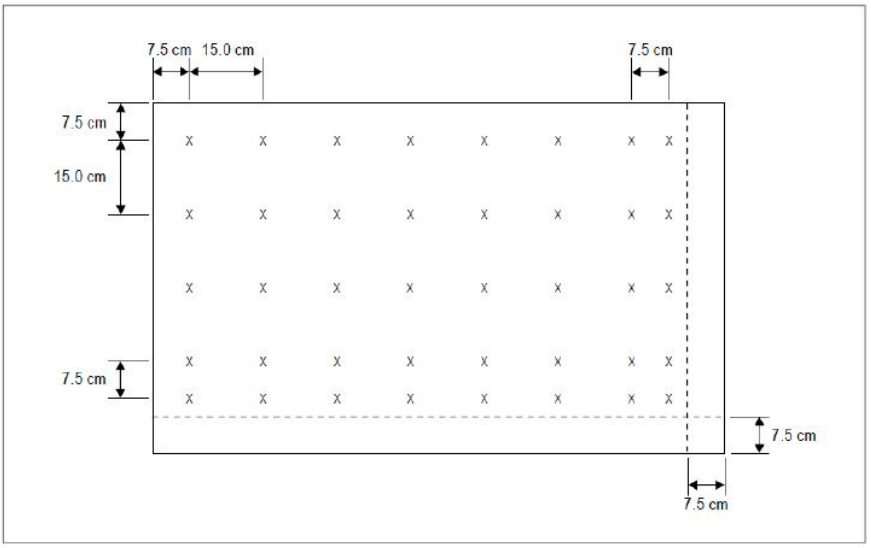


Figure CS-108: Grid points for average luminance calculation

Note 1: The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:

(a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.

(b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face should be excluded.

(c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point should be added 7.5 cm from this point.

(d) Where a grid point falls on the boundary of a character and the background, the grid point should be slightly shifted to be completely outside the character.

Note 2: Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.

Note 3: Where one unit includes two types of signs, a separate grid should be established for each type.

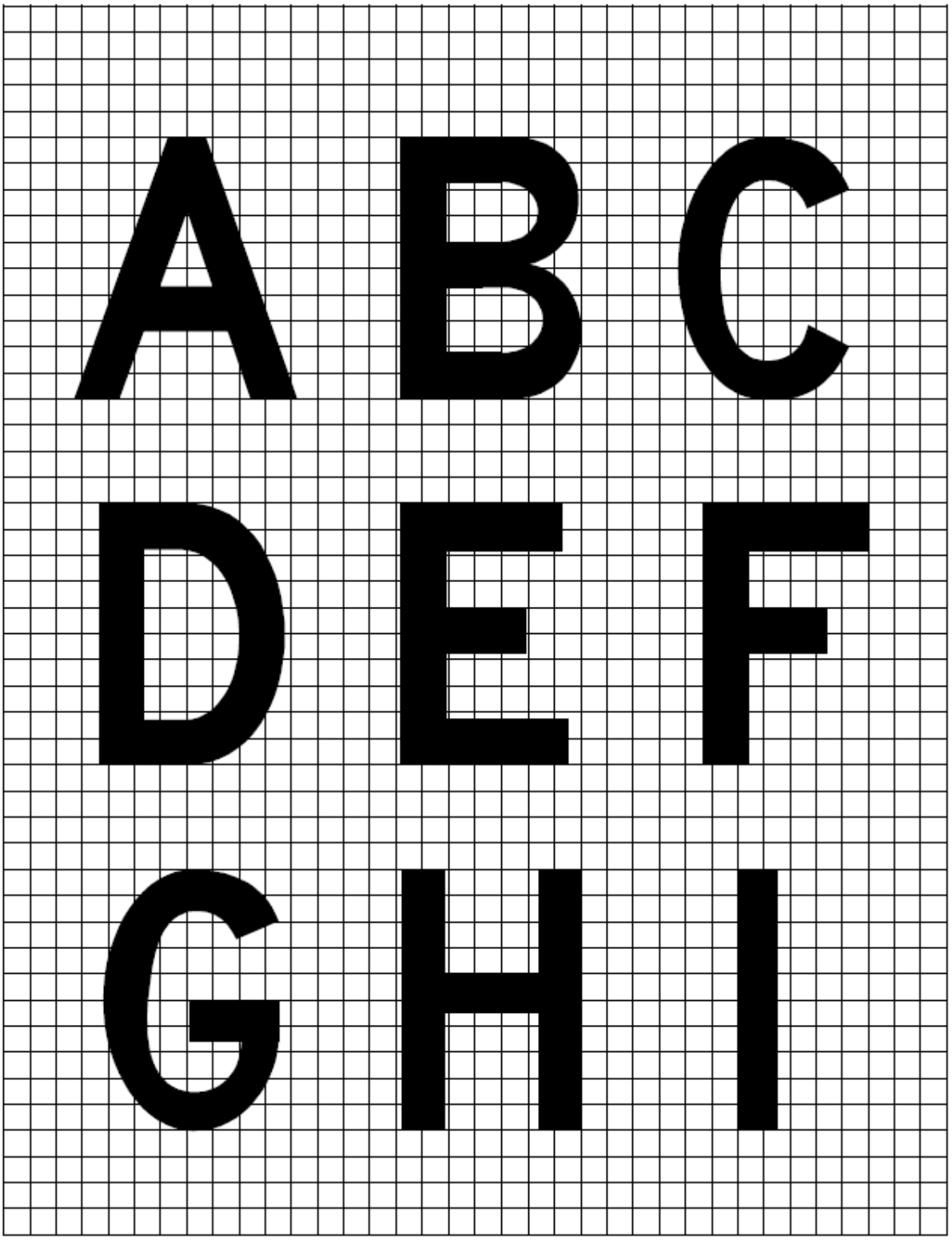


Figure CS-109:(a)Forms of characters for signs

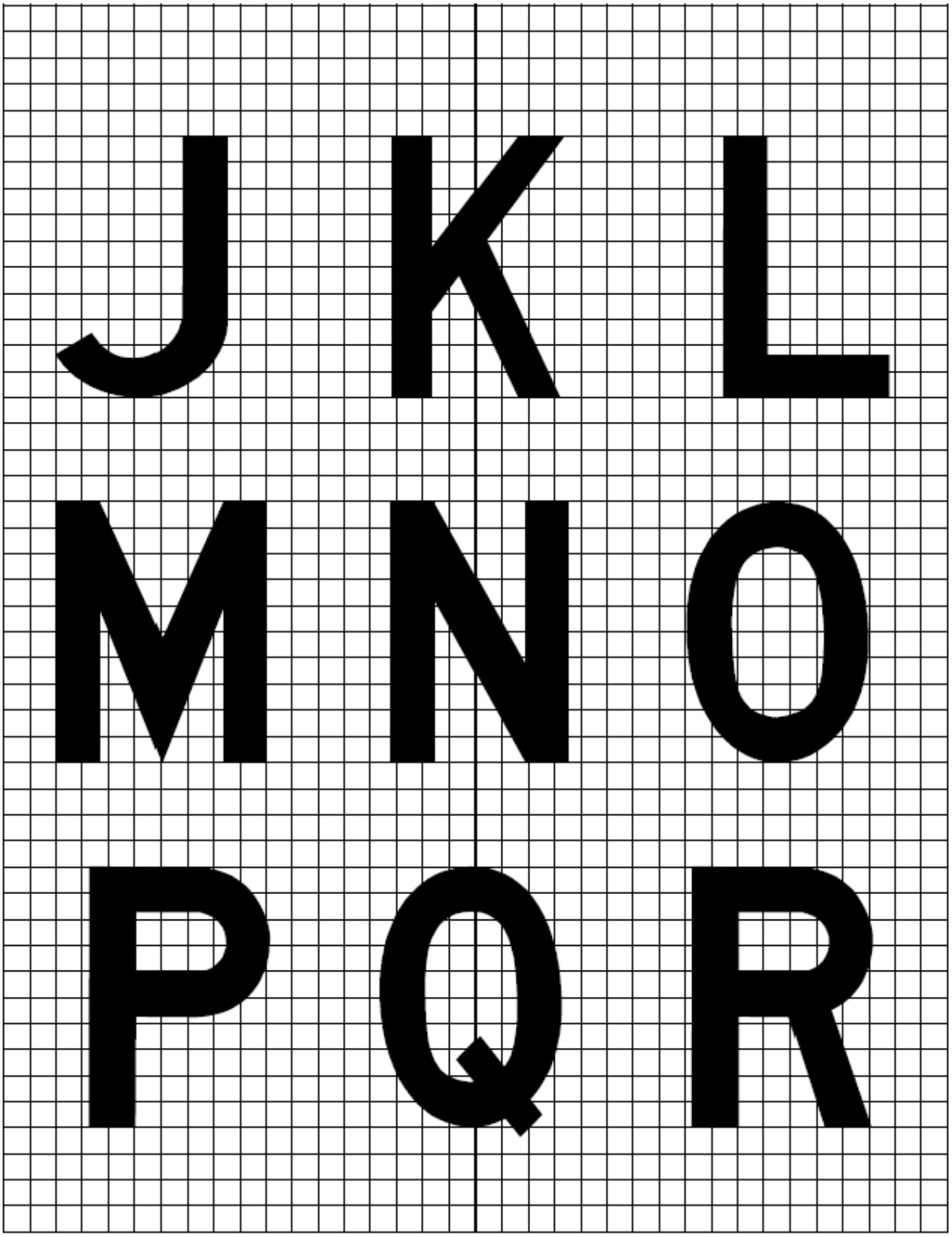


Figure CS-110:(b)Forms of characters for signs

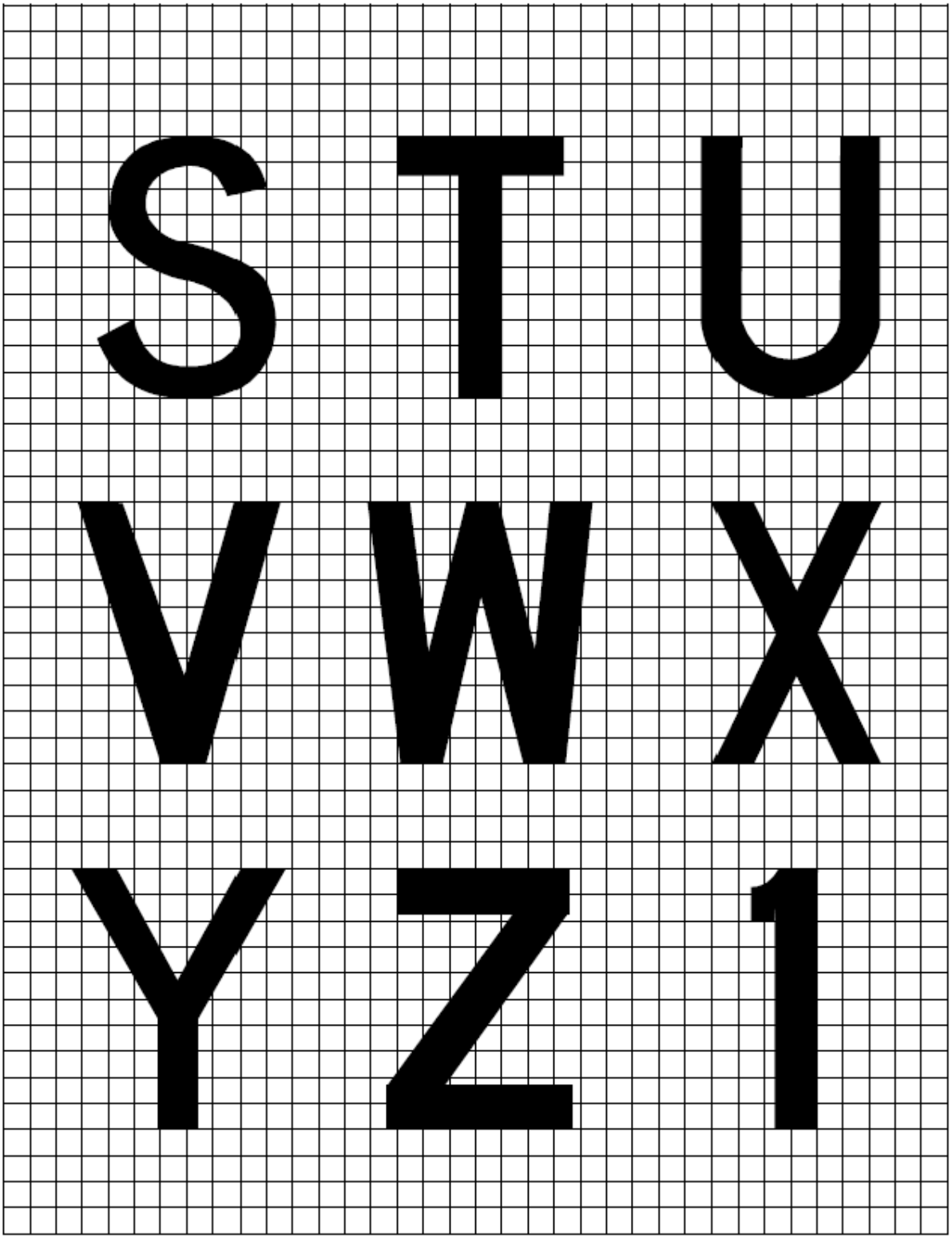


Figure CS-111:(c)Forms of characters for signs

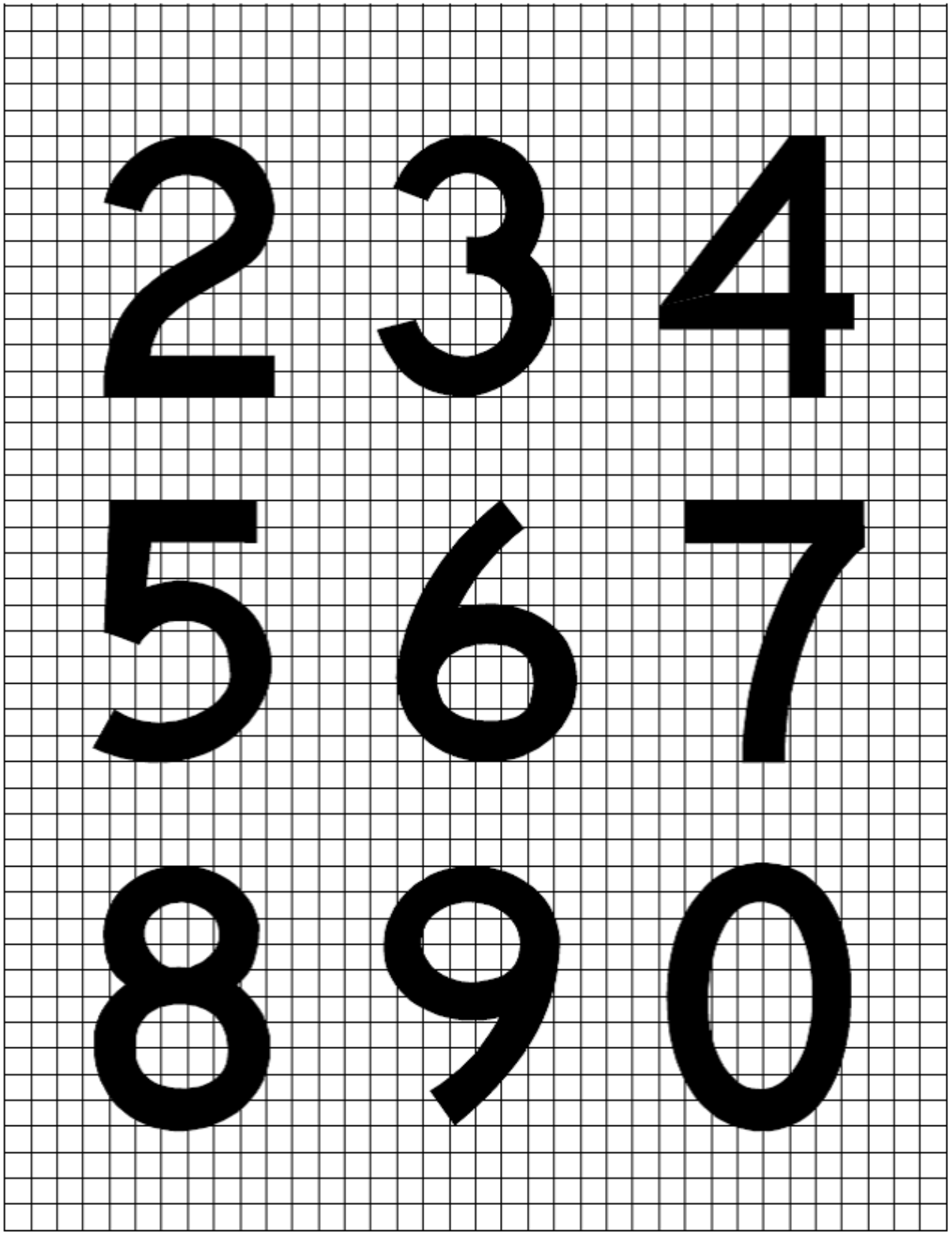


Figure CS-112:(d)Forms of characters for signs

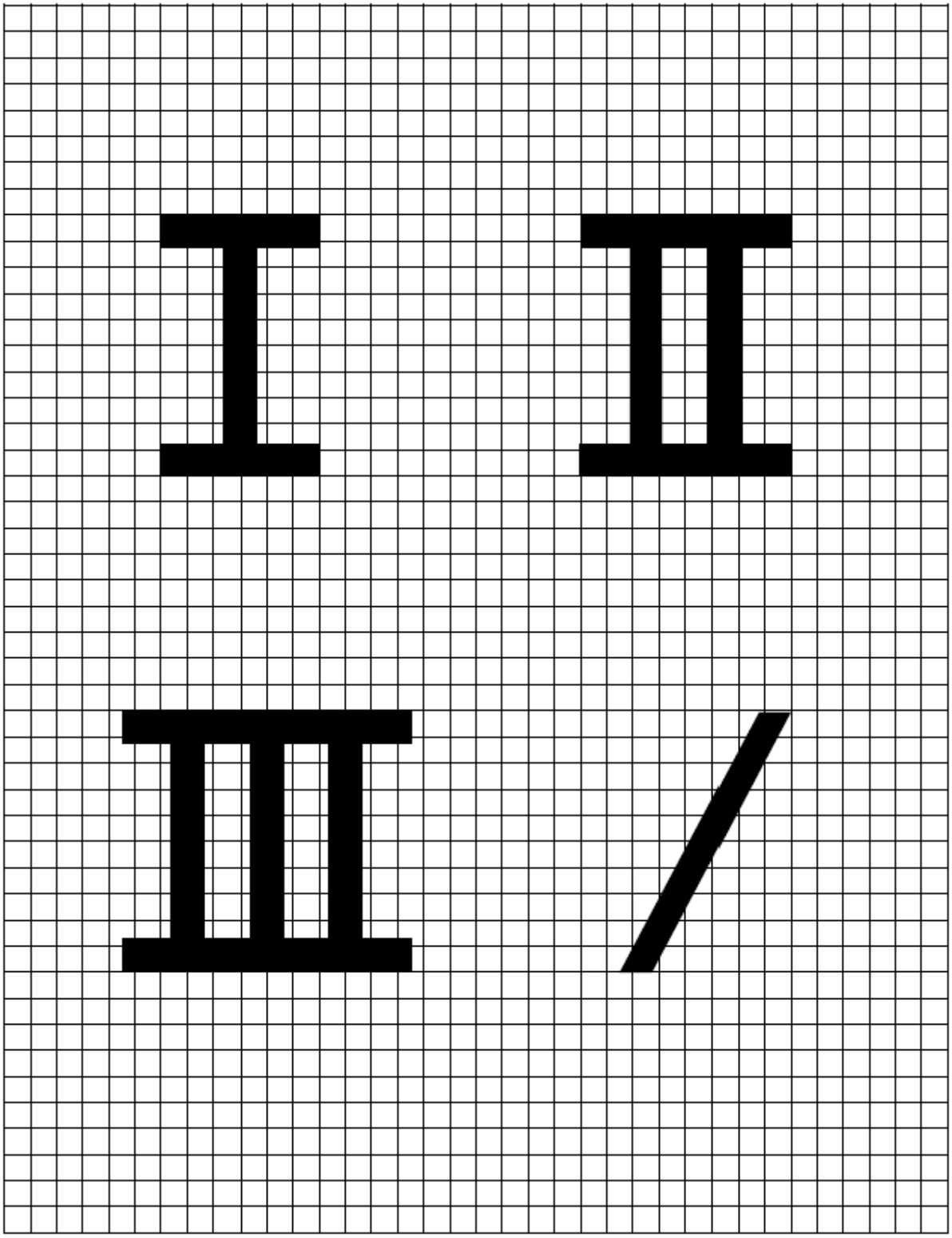


Figure CS-113: (e)Forms of characters for signs

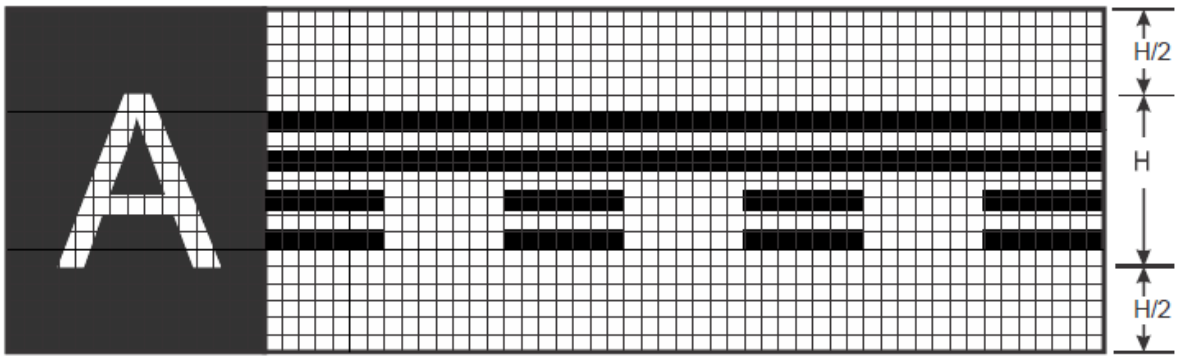


Figure CS-114: Runway vacated sign with typical location sign

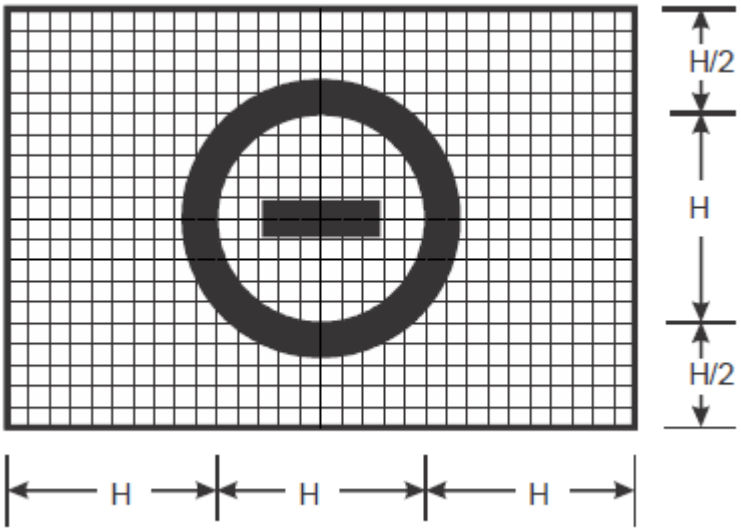
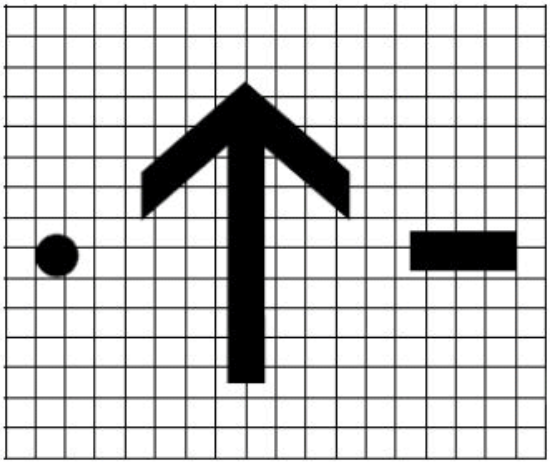


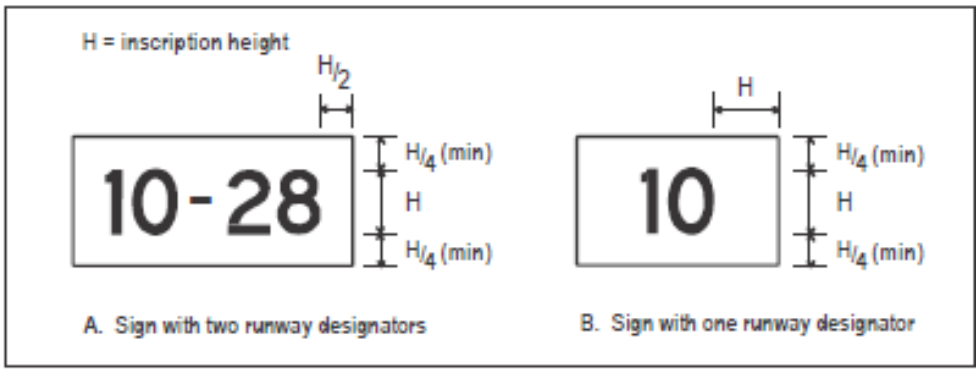
Figure CS-115: No-entry sign



Note 1. — The arrow stroke width, diameter of the dot, and both width and length of the dash should be proportioned to the character stroke widths.

Note 2. — The dimensions of the arrow should remain constant for a particular sign size, regardless of orientation.

Figure CS-116: Forms of characters for signs(Arrow)



H – stands for inscription height

Figure CS-117: Sign dimensions

a) Letter to letter code number			
Preceding Letter	Following Letter		
	B, D, E, F, H, I, K, L, M, N, P, R, U	C, G, O, Q, S, X,	A, J, T, V, W, Y
	Code number		
A	2	2	4
B	1	2	2
C	2	2	3
D	1	2	2
E	2	2	3
F	2	2	3
G	1	2	2
H	1	1	2
I	1	1	2
J	1	1	2
K	2	2	3
L	2	2	4
M	1	1	2
N	1	1	2
O	1	2	2
P	1	2	2
Q	1	2	2
R	1	2	2
S	1	2	2
T	2	2	4
U	1	1	2
V	2	2	4

W	2	2	4
X	2	2	3
Y	2	2	4
Z	2	2	3

b) Numeral to numeral code number			
Preceding Numeral	Following number		
	1, 5	2, 3, 6, 8, 9, 0	4, 7
	Code number		
1	1	1	2
2	1	2	2
3	1	2	2
4	2	2	4
5	1	2	2
6	1	2	2
7	2	2	4
8	1	2	2
9	1	2	2
0	1	2	2

c) Space between characters			
Code No.	Character height (mm)		
	200	300	400
	Space (mm)		
1	48	71	96
2	38	57	76

3	25	38	50
4	13	19	26

d) Width of letter			
Letter	Letter height (mm)		
	200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286
R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	152	229	304
W	178	267	356
X	137	205	274

Y	171	257	342
Z	137	205	274

e) Width of numeral			
Numeral	Numeral height (mm)		
	200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

Table CS-71: Letter and numeral width and space between letters or numerals

Instructions

(a) To determine the proper space between letters or numerals, obtain the code number from table a) or

(b) and enter table c) for that code number to the desired letter or numeral height.

(c) The space between words or groups of characters forming an abbreviation or symbol should be equal to

(d) 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A→', the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.

(e) Where the numeral follows a letter or vice versa, use Code 1.

(f) Where a hyphen, dot, or diagonal stroke follows a character or vice versa, use Code 1.

(g) For the intersection take-off sign, the height of the lower case 'm' is 0.75 of the height of the preceding

(h) character. The spacing from the preceding character is at Code 1 for the character height in Table CS-59(c).

GM1 ADR-DSN.N.775 General

(a) Signs may need to be orientated to improve readability. Guidance on signs is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, Chapter 11.

(b) Guidance on frangibility is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 6, Frangibility.

(c) Guidance on measuring the average luminance of a sign is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(d) Additional guidance on determining the face width of a sign is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.N.780 Mandatory instruction signs

(a) Applicability:

(1) A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorised by the aerodrome control tower.

(2) Mandatory instruction signs shall include runway designation signs, Category I, II, or III holding position signs, runway-holding position signs, road-holding position signs, and no-entry signs. Mandatory Instruction Signs shall include Intermediate Holding Positions when it is part of a surface movement and guidance control system used to provide traffic control by visual means.

(3) A pattern 'A' runway-holding position marking shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign. If the runway holding position is designated as a Category I, II or III holding position, the marking shall be

supplemented with a Category I, II or III holding position sign.

(4) A pattern 'B' runway-holding position marking shall be supplemented with a Category I, II, or III holding position sign.

(5) A pattern 'A' runway-holding position marking at a runway-holding position shall be supplemented with a runway-holding position sign.

(6) A runway designation sign at a taxiway/runway intersection shall be supplemented with a location sign in the outboard (farthest from the taxiway) position as appropriate.

(7) A road-holding position sign shall be provided at all road entrances to a runway and may also be provided at road entrances to taxiways.

(8) A no-entry sign shall be provided when entry into an area is prohibited.

(9) Where a stop bar is provided as per CS ADR-DSN.M.730 (3), mandatory instruction signs shall be provided at an Intermediate Holding Position.

(b) Location:

(1) A runway designation sign at a taxiway/runway intersection or a runway/runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway.

(2) A Category I, II, or III holding position sign shall be located on each side of the runway-holding position marking facing the direction of the approach to the critical area.

(3) A no-entry sign shall be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

(4) A runway-holding position sign shall be located on each side of the runway-holding position facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area as appropriate.

(5) A mandatory instruction sign, where provided, at an intermediate holding position shall be located on each side of the taxiway at the intermediate holding position.

(c) Characteristics:

(1) A mandatory instruction sign shall consist of an inscription in white on a red background.

(2) Where, owing to environmental or other factors, the conspicuity of the inscription on a mandatory instruction sign needs to be enhanced, the outside edge of the white inscription should be supplemented by a black outline measuring 10 mm in width for runway code numbers 1 and 2, and 20 mm in width for runway code numbers 3 and 4.

(3) The inscription on a runway designation sign shall consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of a runway extremity may show the runway designation of the concerned runway extremity only.

(4) The inscription on a Category I, II, III, joint II/III or joint I/II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III, CAT II/III or CAT I/II/III, as appropriate.

(5) The inscription on a no-entry sign shall be in accordance with Figure CS-118.

(6) The inscription on a runway-holding position sign at a runway-holding position shall consist of the taxiway designation and a number.

(d) Where installed, the inscriptions/symbol of Figure CS-119 shall be used:

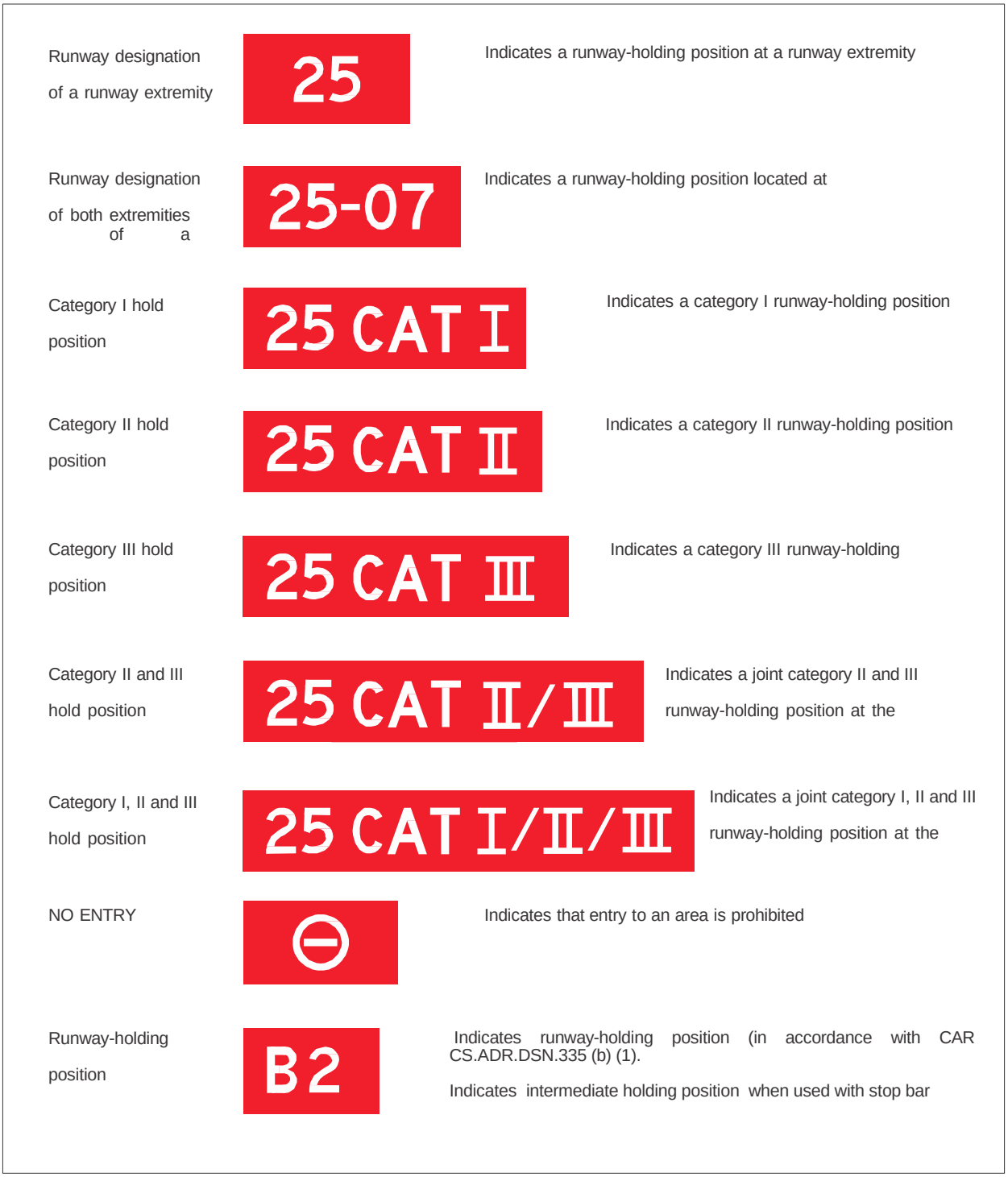
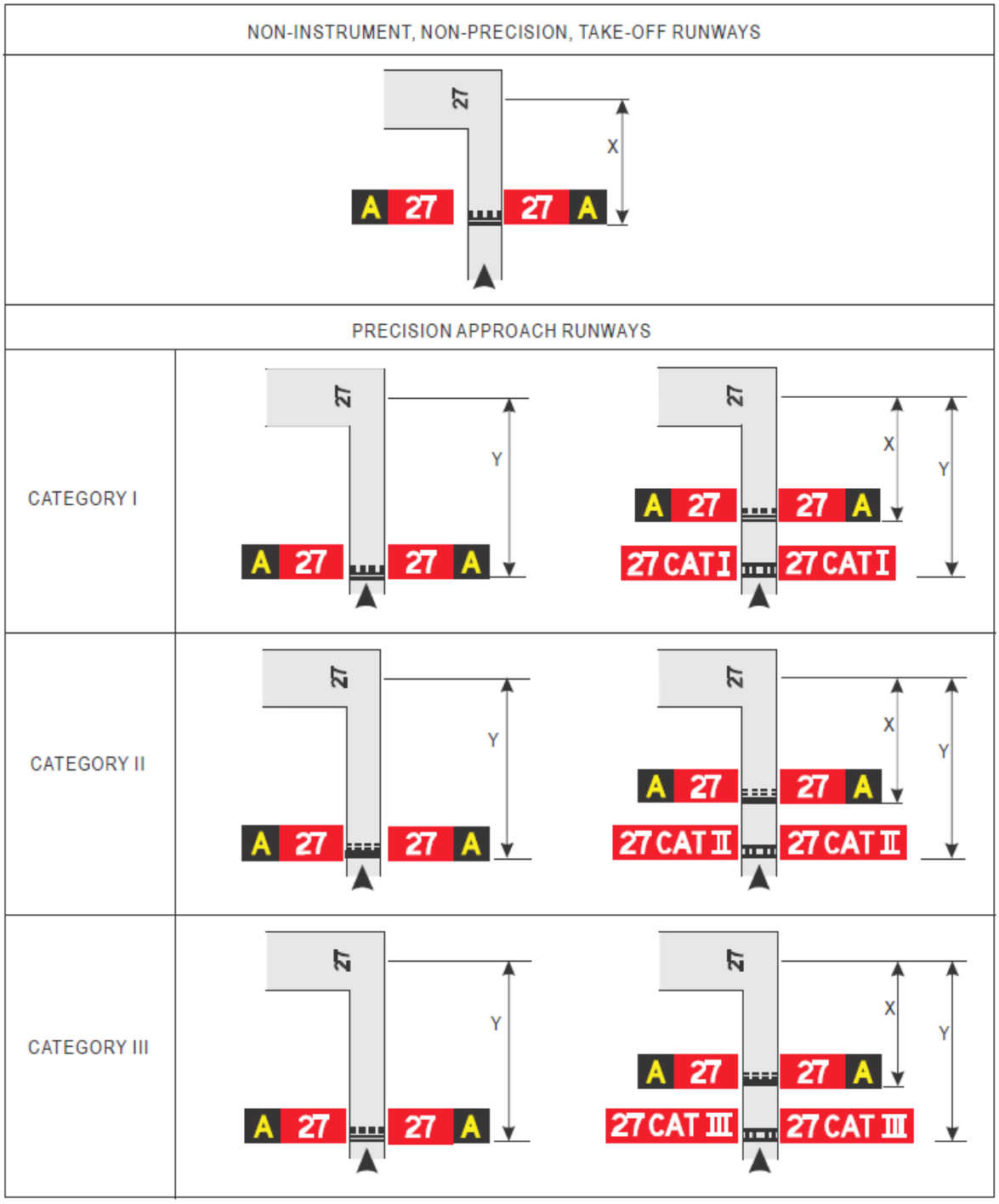


Figure CS-120: Mandatory instructions signs



Note: Distance X is established in accordance with Table D-2. Distance Y is established in accordance with Table D-2 and for precision approach or at at the edge of ILS/MLS critical/sensitive area, whichever is further.

Figure CS-121: Positions of signs at taxiway/runway intersections

CS ADR-DSN.N.785 Information signs

(a) Applicability:

(1) An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

(2) Information signs shall include: direction signs, location signs including aircraft stand identification sign, INS sign and VOR checkpoint sign, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

(3) A runway exit sign shall be provided where there is an operational need to identify a runway exit.

(4) A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area, or the lower edge of the inner transitional surface whichever is farther from the runway centre line.

(5) An intersection take-off sign shall be provided to indicate the remaining take-off run available (TORA) for such intersection take- offs.

(6) Where multiple aprons are provided, or elsewhere considered to be operationally necessary, a destination sign shall be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.

(7) A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

(8) A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

(9) A location sign shall be provided at an intermediate holding position. Where a stop bar is provided at an Intermediate Holding Position, mandatory instruction signs shall be provided at an Intermediate Holding Position.

(10) A location sign shall be provided in conjunction with a runway designation sign except at a runway/runway intersection.

(11) A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an Aeronautical Study indicates that it is not needed .

(12) Where necessary, a location sign shall be provided to identify taxiways exiting an apron or taxiways beyond an intersection.

(13) Where a taxiway ends at an intersection such as a 'T' and it is necessary to identify this, a barricade, direction sign, and/or other appropriate visual aid shall be used.

(b) Location:

(1) Except as specified in paragraph (b)(3)(11) below, information signs shall wherever practicable, be located on the left-hand side of the taxiway in accordance with Table CS-52.

(2) At a taxiway intersection, information signs shall be located prior to the intersection and in line with the intermediate holding position marking. Where there is no intermediate holding position marking, the signs shall be installed at least 60 m from the centre line of the intersecting taxiway where the code number is 3 or 4, and at least 40 m where the code number is 1 or 2.

(3) A runway exit sign shall be located on the same side of the runway as the exit is located (i.e. left or right), and positioned in accordance with Table CS-52.

(4) A runway exit sign shall be located prior to the runway exit point in line with a position at least 60 m prior to the point of tangency where the code number is 3 or 4, and at least 30 m where the code number is 1 or 2.

(5) A runway vacated sign shall be located at least on one side of the taxiway. The distance between the sign and the centre line of a runway shall be not less than the greater of the following:

(i) the distance between the centre line of the runway and the perimeter of the ILS/MLS critical/sensitive area; or

(ii) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

(6) Where provided in conjunction with a runway vacated sign, the taxiway location sign shall be positioned outboard of the runway vacated sign.

(7) An intersection take-off sign shall be located at the left-hand side of the entry taxiway. The distance between the sign and the centre line of the runway shall be not less than 60 m where the code number is 3 or 4 and not less than 45 m where the code number is 1 or 2.

(8) A taxiway location sign installed in conjunction with a runway designation sign shall be positioned outboard of the runway designation sign.

(9) A destination sign should not normally be collocated with a location or direction sign.

(10) An information sign other than a location sign shall not be collocated with a mandatory instruction sign.

(11) A direction sign, barricade and/or other appropriate visual aid used to identify a ‘‘T’ ‘intersection shall be located on the opposite side of the intersection facing the taxiway.

(c) Characteristics:

(1) An information signs other than a location sign shall consist of an inscription in black on a yellow background.

(2) A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign, shall have a yellow border.

(3) The inscription on a runway exit sign shall consist of the designator of the exit taxiway and an arrow indicating the direction to follow.

(4) The inscription on a runway vacated sign shall depict the pattern A runway-holding position marking as shown in Figure CS-122.

(5) The inscription on an intersection take-off sign shall consist of a numerical message indicating the remaining take-off run available in metres, plus an arrow, appropriately located and oriented, indicating the direction of the take-off as shown in Figure CS-123.

(6) The inscription on a destination sign shall comprise an alpha, alphanumerical or numerical message identifying the destination, plus an arrow indicating the direction to proceed as shown in Figure CS-124.

(7) The inscription on a direction sign shall comprise an alpha or alphanumerical message identifying the taxiway(s), plus an arrow or arrows appropriately oriented as shown in

Figure CS-125.

(8) The inscription on a location sign shall comprise the designation of the location taxiway, runway, or other pavement the aircraft is on or is entering, and shall not contain arrows.

(9) Where it is necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign shall consist of the taxiway designation and a progressive number.

(10) Where a location sign and direction signs are used in combination:

(i) all direction signs related to left turns shall be placed on the left side of the location sign and all direction signs related to right turns shall be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left hand side;

(ii) the direction signs shall be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

(iii) an appropriate direction sign shall be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

(iv) adjacent direction signs shall be delineated by a vertical black line as shown in Figure CS-126.

(d) A taxiway shall be identified by a designator that is used only once on an aerodrome and comprising a single letter, two letters, or a combination of a letter or letters followed by a number.

(e) When designating taxiways:

(1) the letters I, O, or X shall not be used to avoid confusion with the numerals 1, 0, and the closed marking;

(2) the use of words such as ‘inner’ and ‘outer’ shall be avoided wherever possible.

(f) The use of numbers alone on the manoeuvring area shall be reserved for the designation of runways.

(g) Apron stand designators should not be the same as taxiway designators.

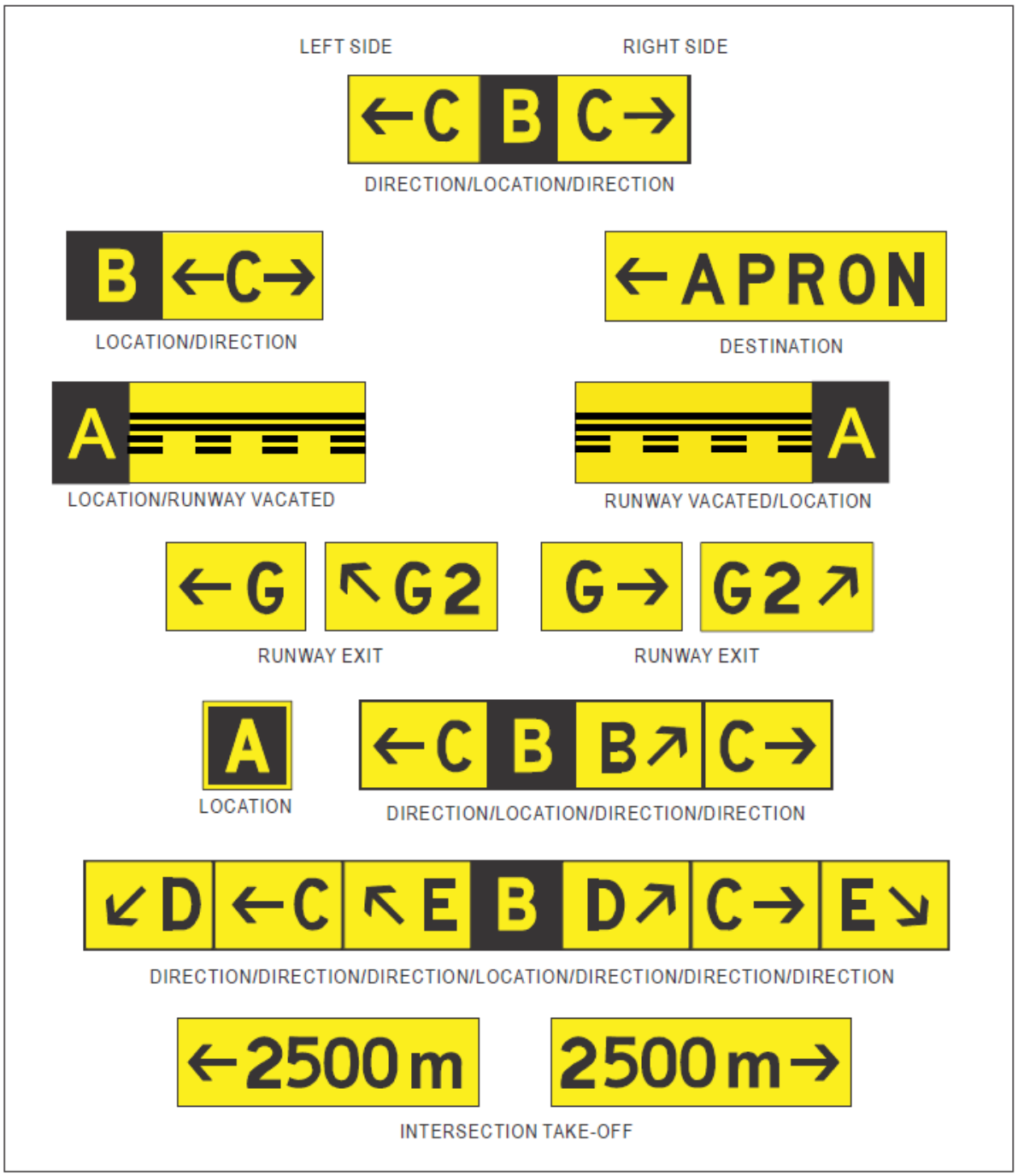


Figure CS-127: Information signs

GM1 ADR-DSN.N.785 Information signs

(a) When an installation of information sign on the left-hand side is not possible, e.g. due to

infrastructural or operational restrictions, an installation on the right-hand side of the taxiway

in accordance with the specifications given in Table CS-52 may also be acceptable when a safety assessment indicates that it would not adversely affect the safety of operations of aeroplanes.

(b) At a 'T' intersection, information signs may be located in the direction of the taxiway centre line to the opposite side of the crossing taxiway when a safety assessment indicates that guidance could be assured under all intended operating conditions and that it would not adversely affect the safety of operations of aeroplanes.

(c) A location sign installed beyond a taxiway intersection may be installed on either side of a taxiway.

CS ADR-DSN.N.790 VOR aerodrome checkpoint sign

When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

(a) Location: A VOR aerodrome check-point sign shall be located as near as possible to the check-point and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome check-point marking.

(b) Characteristics:

(1) A VOR aerodrome check-point sign shall consist of an inscription in black on a yellow background.

(2) The inscriptions on a VOR check-point sign shall be in accordance with one of the alternatives shown in Figure CS-103 in which:

VOR	is an abbreviation identifying this as a VOR check-point;
116.3	is an example of the radio frequency of the VOR concerned;
147°	is an example of the VOR bearing, to the nearest degree, which should be indicated at the VOR check-point; and
4.3 NM	is an example of the distance in nautical miles to a DME collocated with the VOR concerned.

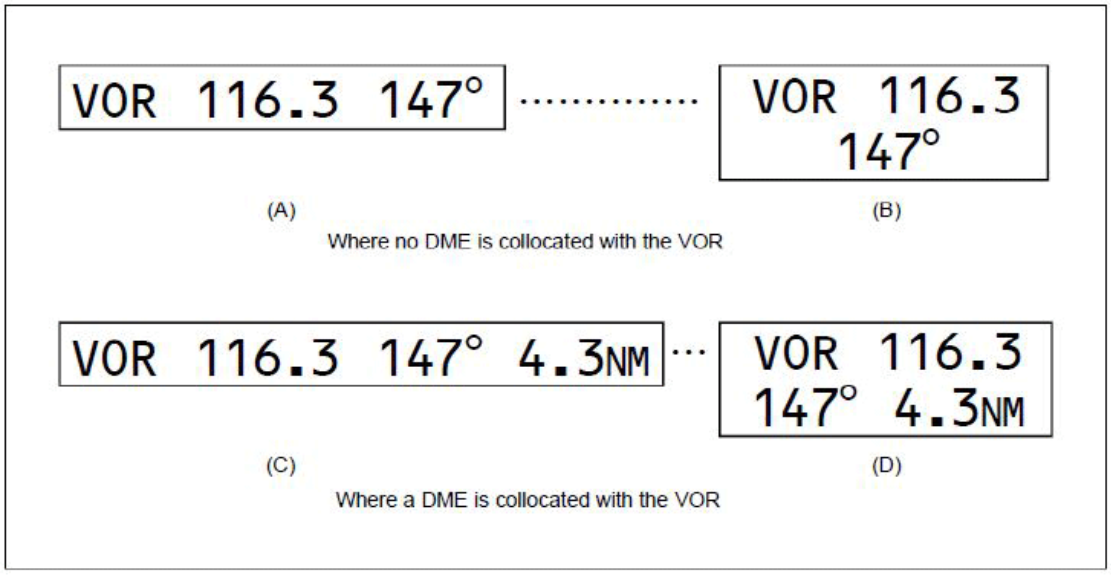


Figure CS-128: VOR aerodrome check-point sign

CS ADR-DSN.N.790 VOR aerodrome checkpoint sign

Tolerances for the bearing value shown on the sign are given in Annex 10, Volume I, Attachment E. It will be noted that a checkpoint can only be used operationally when periodic checks show it to be consistently within ±2 degrees of the stated bearing.

CS ADR-DSN.N.791 Aerodrome identification sign

(a) An aerodrome identification sign shall be provided at an aerodrome where there is insufficient alternative means of visual identification.

(b) Location: The aerodrome identification sign should be placed on the aerodrome so as to be legible, in so far as is practicable, at all angles above the horizontal.

(c) Characteristics:

(1) The aerodrome identification sign shall consist of the name of the aerodrome.

(2) The colour selected for the sign should give adequate conspicuity when viewed against its background

(3) The characters shall have a height of not less than 3 m.

CS ADR-DSN.N.795 Aircraft stand identification signs

(a) Applicability: An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where feasible

(b) An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where a nose in guidance system is provided.

(c) Location: Where installed an aircraft stand identification sign shall be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

(d) Characteristics: An aircraft stand identification sign shall consist of an inscription in black on a yellow background.

(e) The size of the inscription shall be such that the letters are easily distinguishable from the taxilane where the aircraft stand commences, and shall be illuminated, where the aircraft stand is utilised at night.

CS ADR-DSN.N.796 INS signs

(a) Application: An aircraft stands coordinate sign (INS sign) shall be provided whenever an aircraft stand identification sign is provided.

(b) Location: An INS sign shall be located in a position that is readably visible to the pilots occupying either the left or the right seat, and preferable at the nose of the aircraft.

(c) Characteristics:

(1) An INS sign shall consist of an inscription in black on a yellow background.

(2) An INS sign inscription shall consist of the aircraft stand number and the coordinates of the aircraft stand in WGS84 format. Coordinates shall be displayed to two decimal places.

(3) The coordinates shall be displayed on two lines with the Latitude coordinate displaying above the Longitudinal coordinate.

The coordinates displayed shall be the same as those published in the AIP Aerodrome Ground Chart. The location, for which the coordinates apply, shall be the central point where the taxiway centre line and stop block intersect, for the forward most stopping position on the aircraft stand.

GM1 CS ADR-DSN.N.796 INS signs

The aircraft stand number does not have to be included where the sign is collocated with the aircraft stand identification sign, or where no confusion can exist as to the which aircraft stand the coordinates apply.

CS ADR-DSN.N.800 Road-holding position sign

(a) Applicability: A road-holding position sign shall be provided at all road entrances to a runway.

(b) Location: The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local road traffic regulations) at the holding position.

(c) Characteristics:

(1) A road-holding position sign at an intersection of a road with a runway shall consist of an inscription in white on a red background.

(2) The inscription on a road-holding position sign shall be in English and Arabic, be in conformity with the local road traffic regulations, and include the following:

(i) a requirement to stop; and

(ii) where appropriate:

(A) a requirement to obtain ATC clearance; and

(B) location designator.

(3) A road-holding position sign intended for night use shall be retroreflective or illuminated.

CHAPTER O — (intentionally left blank)

CHAPTER P — VISUAL AIDS FOR NAVIGATION (MARKERS)

CS ADR-DSN.P.805 General

Markers shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers, and for the engine pods of jet aircraft.

GM1 ADR-DSN.P.805 General

(a) Guidance on frangibility of markers is given in the Aerodrome Design Manual (Doc 9157), Part 6.

CS ADR-DSN.P.810 Unpaved runway edge markers

(a) Applicability: Markers shall be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

(b) Location:

(1) Where runway lights are provided, the markers shall be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape should be placed so as to delimit the runway clearly.

(c) Characteristics

(1) The flat rectangular markers shall have a minimum size of 1 m by 3 m, and shall be placed with their long dimension parallel to the runway centre line. The conical markers shall have a height not exceeding 0.50 m.

CS ADR-DSN.P.815 Stopway edge markers

(a) Applicability: Stopway edge markers shall be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

(b) Characteristics: The stopway edge markers shall be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

GM1 ADR-DSN.P.815 Stopway edge markers

Markers consisting of small vertical boards camouflaged on the reverse side, as viewed from the runway, have proved operationally acceptable.

CS ADR-DSN.P.825 Taxiway edge markers

(a) Taxiway edge markers should be provided on a taxiway where the code number is 1 or 2 and

taxiway centre line or edge lights or taxiway centre line markers are not provided.

(b) Location: Taxiway edge markers should be installed at least at the same locations as would the taxiway edge lights, had they been used.

(c) Characteristics:

(1) A taxiway edge marker shall be retroreflective blue.

(2) The marked surface as viewed by the pilot should be a rectangle and shall have a minimum viewing area of 150 cm^2.

(3) Taxiway edge markers shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

GM1 ADR-DSN.P.825 Taxiway edge markers

(a) At small aerodromes, taxiway edge markers may be used, in lieu of taxiway edge lights, to delineate the edges of taxiways, particularly at night. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(b) On a straight section of a taxiway, taxiway edge markers should be spaced at uniform longitudinal intervals of not more than 60 m. On a curve the markers should be spaced at intervals less than 60 m so that a clear indication of the curve is provided. The markers should be located as near as practicable to the edges of the taxiway, or outside the edges at a distance of not more than 3 m. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(c) The markers commonly used are cylindrical in shape. Ideally, the design of the marker should be such that when installed properly, no portion should exceed 35 cm total height above the mounting surface. However, where significant sand heights are possible, markers exceeding 35 cm in height may be used but their total height should be sufficiently low to preserve clearance for propellers, and for the engine pods of jet aircraft. Additional guidance is given is ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(d) A taxiway edge marker should be lightweight and frangible. One type of marker meeting these requirements is detailed in Figure CS-104. The post is made up of sub PVC and its colour is blue. The sleeve which is retro-reflective, is also blue. Note that the area of the marked surface is 150 cm2. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4,

Visual Aids.

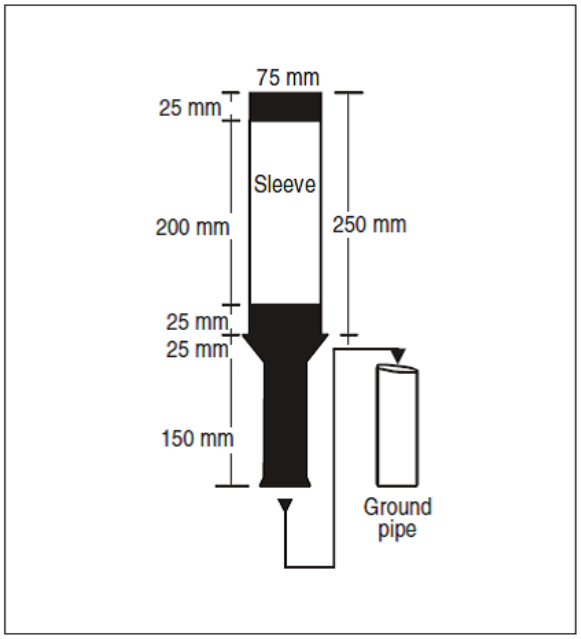


Figure CS-129: Taxiway edge marker

CS ADR-DSN.P.830 Taxiway centerline markers

(a) Applicability:

Taxiway centre line markers should be provided on a taxiway where the Code Number is 1 or 2 and taxiway centre line or edge lights or taxiway edge markers are not provided.

(b) Location

(1) Taxiway centre line markers shall be installed at least at the same location as would taxiway centre line lights had they been used.

(2) Taxiway centre line markers should normally be located on the taxiway centre line marking except that they may be offset by not more than 0.3 m where it is not practicable to locate them on the marking.

(c) Characteristics:

(1) A taxiway centre line marker shall be retroreflective green.

(2) The marked surface as viewed by the pilot should be a rectangle, and should have a minimum viewing area of 20 cm^2.

(3) Taxiway centre line markers shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

CS ADR-DSN.P.835 Unpaved taxiway edge markers

(a) Applicability: Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers shall be provided.

(b) Characteristics:

(1) Where taxiway lights are provided, the markers shall be incorporated in the light fixtures.

(2) Where there are no lights, suitable markers shall be placed so as to clearly delineate the taxiway.

CS.ADR-DSN.P.836 Boundary Markers

(a) Boundary markers shall be provided at an aerodrome where the Landing surface has no runway.

(b) Location: Boundary markers shall be spaced along the boundary of the Landing Area at intervals of not more than 200 m, if the type shown in below figure is used, or approximately 100 m, if the conical type is used with a marker at any corner.

(c) Characteristics: Boundary markers should be of a form similar to that shown in below figure CS-102, or in the form of a cone not less than 50 cm high and not less than 75 cm in diameter at the base. The markers should be coloured to contrast with the background against which they will be seen. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white, should be used, except where such colours merge with the background.

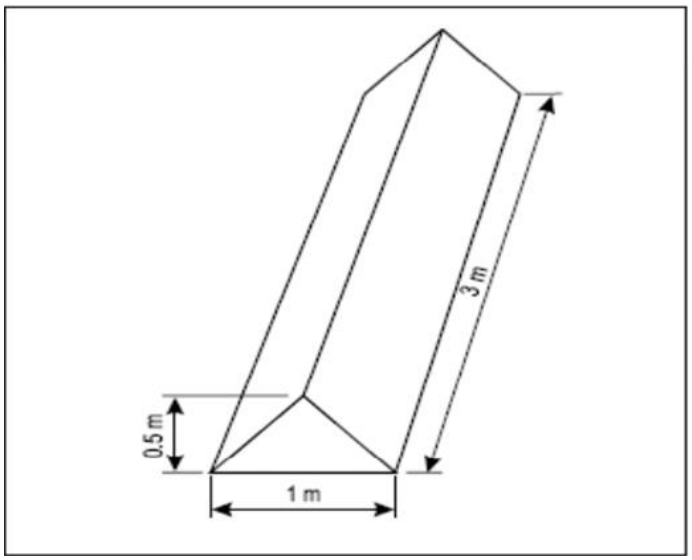


Figure CS-130: Boundary Marker

CHAPTER Q — VISUAL AIDS FOR DENOTING OBSTACLES

CS ADR-DSN.Q.840 Objects to be marked and/or lighted within the lateral boundaries of the obstacle limitation surfaces

(a) Vehicles and other mobile objects, excluding aircraft, on the Movement Area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

(b) Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. Obstacle lights shall not be installed on elevated ground lights or signs in the movement area.

(c) All obstacles within the distance specified in Table CS-37, column (11), (12) or (13), from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane shall be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.

(d) A fixed obstacle that extends above a take-off climb within 3 000 m of the inner edge of the take-off climb or approach surface shall be marked and if the runway is used at night, lighted, except that:

(a) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day, and its height above the level of the surrounding ground does not exceed 150 m;

(c) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights, Type A, are deemed insufficient; and

(d) the lighting may be omitted where the obstacle is a light beacon and an aeronautical study indicates the light beacon light to be sufficient.

(e) A fixed object, other than an obstacle, adjacent to a take-off climb surface shall be marked and, if the runway is used at night, lighted, if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

(1) the object is lighted by medium-intensity obstacle lights, Type A, by day, and its height

above the level of the surrounding ground does not exceed 150 m; or

(2) the object is lighted by high-intensity obstacle lights by day if medium intensity lights, Type A, are deemed insufficient.

(f) A fixed obstacle that extends above an approach surface within 3 000 m of the inner edge or above a transitional surface shall be marked and, if the runway is used at night, lighted, except that:

(1) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(4) the lighting may be omitted where the obstacle is a light beacon and an aeronautical study indicates the light beacon light to be sufficient.

(g) A fixed obstacle that extends above a horizontal surface should be marked and if the aerodrome is used at night, lighted, except that:

(1) such marking and lighting may be omitted when:

(i) the obstacle is shielded by another fixed obstacle; or

(ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

(iii) an aeronautical study shows the obstacle not to be of operational significance;

(2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day, and its height above the level of the surrounding ground does not exceed 150 m;

(3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(4) the lighting may be omitted where the obstacle is a light beacon and an aeronautical study indicates the light beacon light to be sufficient.

(f) A fixed object that extends above an obstacle protection surface should be marked and, if the runway is used at night, lighted, except that such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle

(g) Other objects inside the obstacle limitation surfaces should be marked and/or lighted if an aeronautical study indicates that the object could constitute a hazard to aircraft (this includes objects adjacent to visual routes e.g. waterway or highway).

(h) Overhead wires, cables, etc., crossing a wadi, waterway, valley or highway shall be marked and their supporting towers marked and lighted if an Aeronautical Study indicates that the wires or cables could constitute a hazard to aircraft, except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.

GM1 ADR-DSN.Q.840 Objects to be marked and/or lighted within the lateral boundaries of the obstacle limitation surfaces

(a) The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles. It does not necessarily reduce operating limitations which may be imposed by an obstacle.

(b) An autonomous aircraft detection system may be installed on or near an obstacle (or group of obstacles such as wind farms) within or outside the lateral boundaries of the obstacle limitation surfaces. This system is designed to operate the lighting only when it detects an aircraft approaching the obstacle, to reduce light exposure to local residents. Additional guidance on the design and installation of an autonomous aircraft detection system is available in the ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual .The inclusion of this guidance is not intended to imply that such a system has to be provided.

CS ADR-DSN.Q.842 Objects to be marked and/or lighted outside the lateral boundaries of the obstacle limitation surfaces

(a) Applicability: The specifications for objects to be marked and/or lighted outside the lateral boundaries of the obstacle limitation surfaces.

(b) Obstacles in accordance with CS ADR-DSN.J.487 should be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.

(c) When considered as an obstacle, other objects outside the obstacle limitation surfaces should be marked and/or lighted.

(d) Other objects outside the obstacle limitation surfaces should be marked and/or lighted if an Aeronautical Study indicates that the object could constitute a hazard to aircraft (this includes objects adjacent to visual routes e.g. waterway, highway).

(e) Overhead wires, cables, etc., crossing a wadi, waterway, valley or highway shall be marked and their supporting towers marked and lighted if an aeronautical study indicates that the wires or cables could constitute a hazard to aircraft except that the marking of the supporting towers may be omitted when they are lighted by High-intensity Obstacle Lights by day.

CS ADR-DSN.Q.845 Marking of fixed objects

(a) General: All fixed objects to be marked shall, whenever practicable, be coloured but if this is not practicable, markers or flags should be displayed on or above them, except those objects that are sufficiently conspicuous by their shape, size, or colour need not be otherwise marked.

(b) Marking by colour

(1) An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces, and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast with each other and with the background against which they should be seen. Orange and white or alternatively red and white should be used, except where such colours merge with the background.

(2) An object should be coloured to show alternating contrasting bands if:

(i) it has essentially unbroken surfaces, and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or

(ii) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

(3) The bands should be perpendicular to the longest dimension and have a width

approximately 1/7 of the longest dimension or 30 m, whichever is less. The colours of the bands should contrast with the background against which they will be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour (see Figure CS-131 and Figure CS-132). The dimensions of the marking band widths are shown in Table CS-64.

(4) An object shall be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.

(c) Marking by flags

(1) Flags used to mark fixed objects shall be displayed around, on top of, or around the highest edge of the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15 m. Flags shall not increase the hazard presented by the object they mark.

(2) Flags used to mark fixed objects shall not be less than 0.6 m on each side.

(3) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white. Except where such colours merge with the background, other conspicuous colours should be used.

(d) Marking by markers

(1) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognisable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased.

(2) A marker should be of one colour. When more than one markers are installed, white and red, or white and orange markers should be displayed alternately. The colour selected

should contrast with the background against which it will be seen.

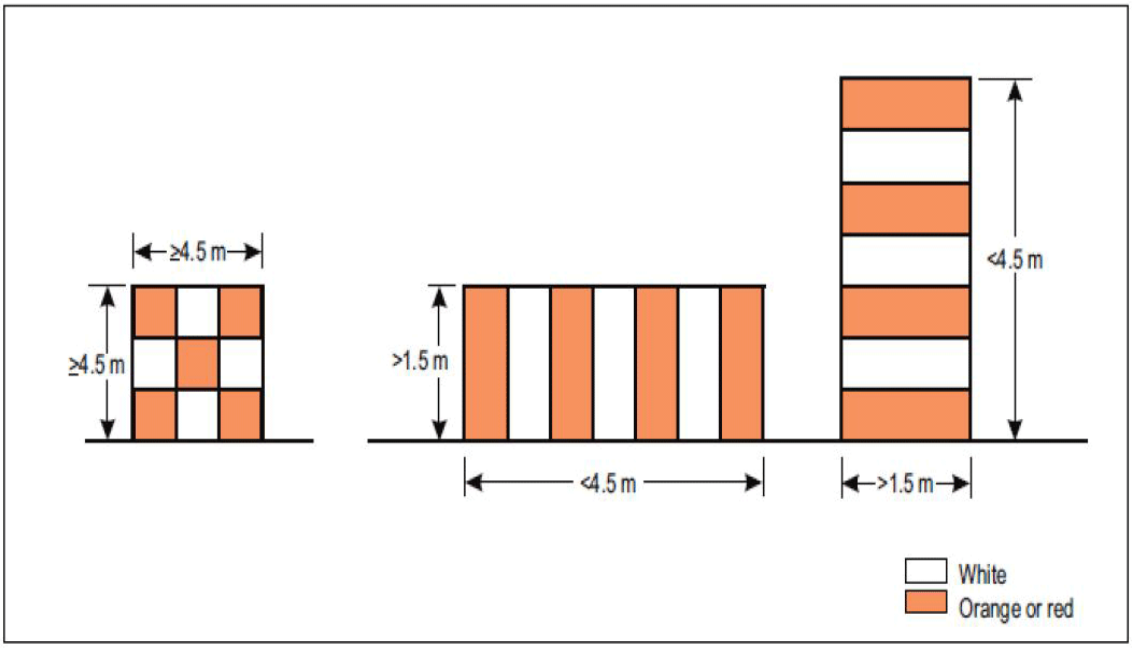


Figure CS-133: Basic marking patterns

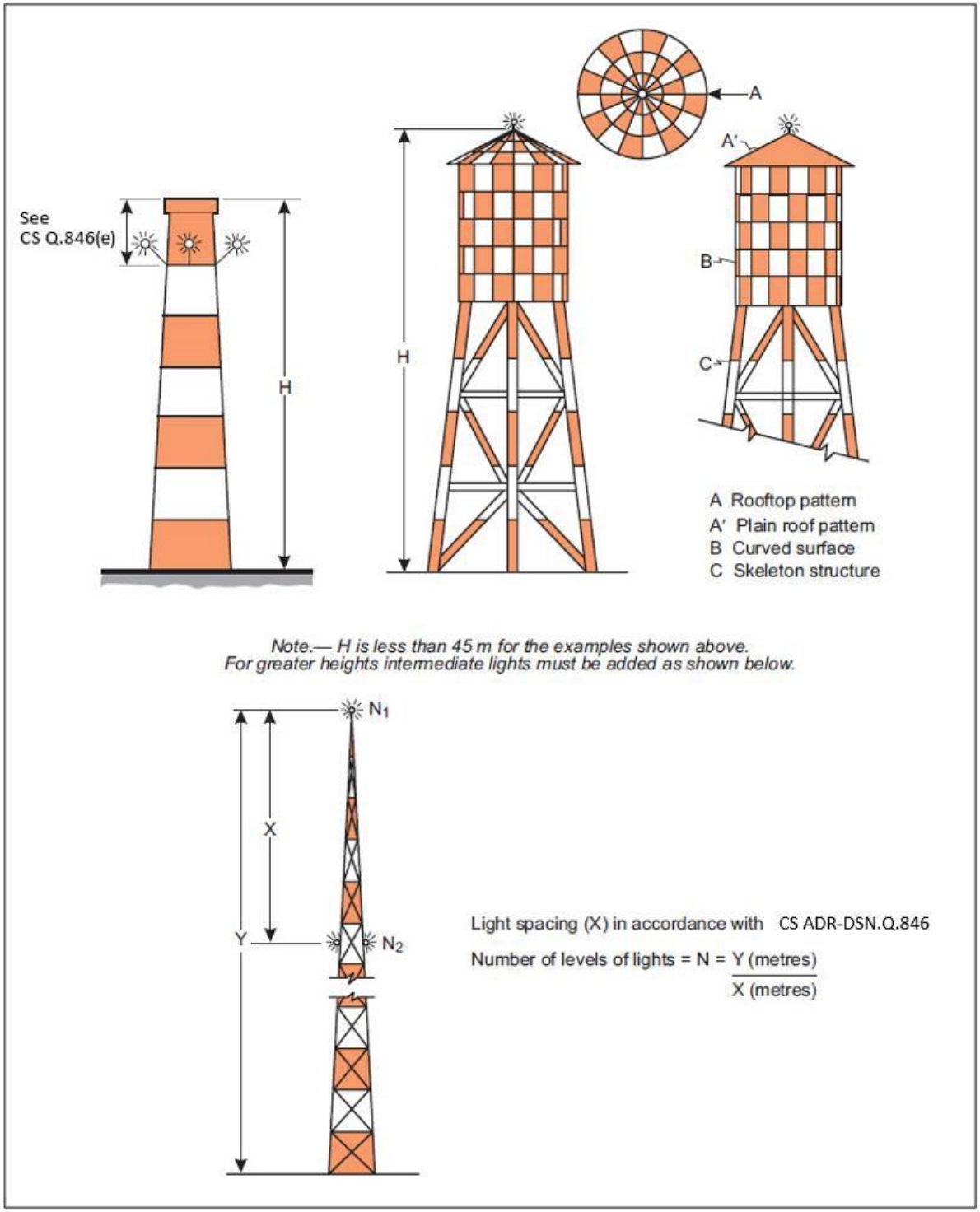


Figure CS-134: Examples of marking and lighting of tall structures

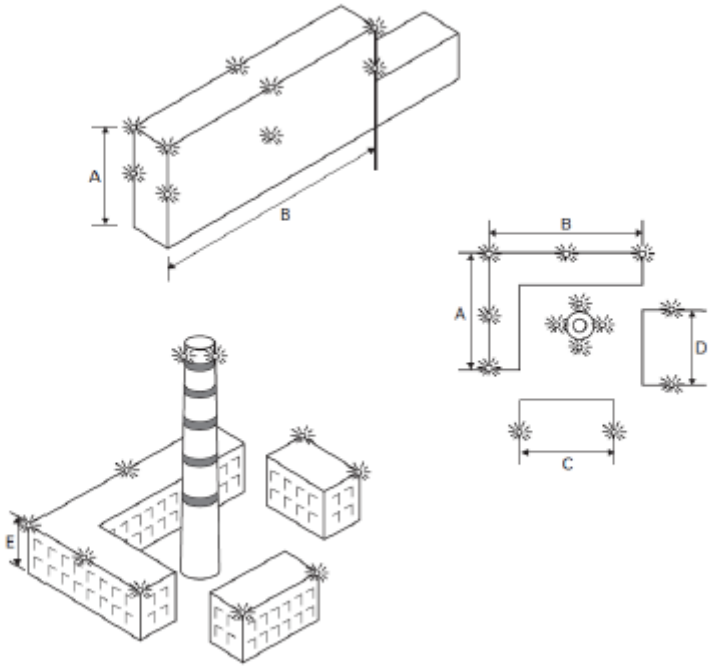


Figure CS-135: Example of obstacle lights on buildings

GM1 ADR-DSN.Q.845 marking of fixed objects

(a) Orange and white or alternatively red and white are preferably used, except where such colours merge with the background.

(b) Table CS-64 shows a formula for determining band widths, and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

(c) Against some backgrounds it may be found necessary to use a different colour from orange or red to obtain sufficient contrast.

(d) Alternative spacing may be suitable; priority is to highlight the location and definition of the object.

CS ADR-DSN.Q.846 Lighting of fixed objects

(a) The presence of objects which should be lighted, as specified in CS ADR-DSN.Q.840 and CS ADR-DSN.Q.841 shall be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

(b) Low-intensity obstacle lights, Types A, B, C and D, medium-intensity obstacle lights, Types A, B and C and high-intensity obstacle lights Types A and B, shall be in accordance with the specifications in Table CS-60 , CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(c) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object or by an adjacent object, additional lights shall be provided on that adjacent object, or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

(d) In case of an object to be lighted one or more low-, medium- or high-intensity obstacle lights should be located as close as practicable to the top of the object.

(e) In the case of chimney or other structure of like function, the top lights should be placed

sufficiently below the top so as to minimise contamination by smoke, etc. (see Figure CS-109).

(f) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance such as a rod or an antenna greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light should be located at the highest practicable point, and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

(g) In the case of an extensive object or of a group of closely spaced objects to be lighted that are:

(1) Penetrating a horizontal obstacle limitation surface (OLS) or located outside an OLS, the top lights should be so arranged as to at least indicate the points or edges of the object highest in relation to OLS or above the ground, and so as to indicate the general definition and the extent of the objects; and

(2) Penetrating a sloping OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the OLS, and so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked.

(h) When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights should be placed on the highest point of the object.

(i) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

(1) Low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m.

(2) Medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

(j) High-intensity obstacle lights, Type A, and medium-intensity obstacle lights, Types A and B, located on an object shall flash simultaneously.

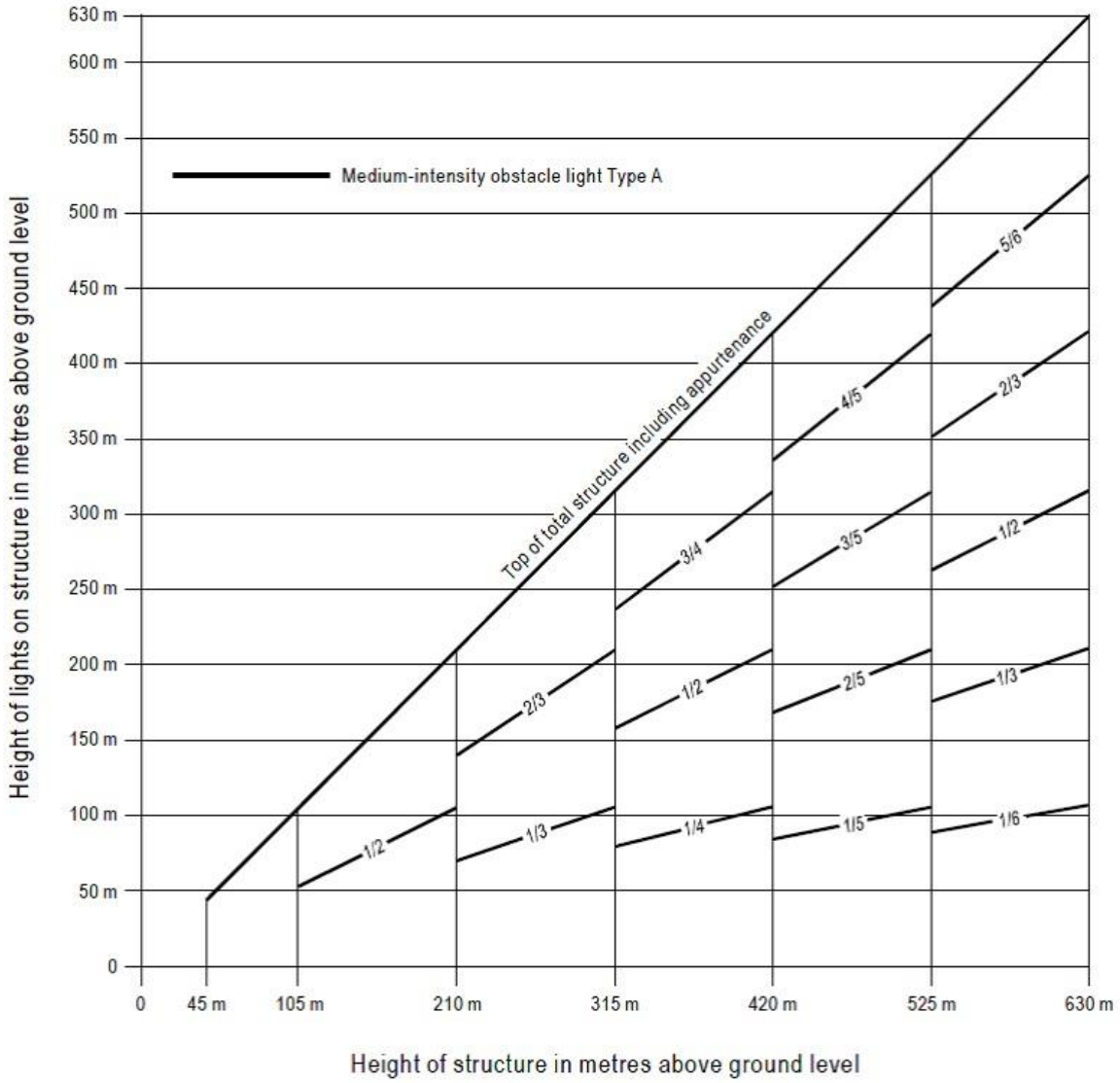
(k) The installation setting angles for high-intensity obstacle lights, Type A, should be in accordance with Table CS-65.

(l) Where, in the opinion of the Appropriate Authority, the use of high-intensity obstacle lights, Type A, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, a dual obstacle lighting system should be provided. This system should be composed of high-intensity obstacle lights, Type A, or medium-intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-time use.

GM1 ADR-DSN.Q.846 Lighting of fixed objects

(a) Guidance on how a combination of low-, medium-, and/or high-intensity lights on obstacles should be displayed is given in Figure CS-136 to CS-114.

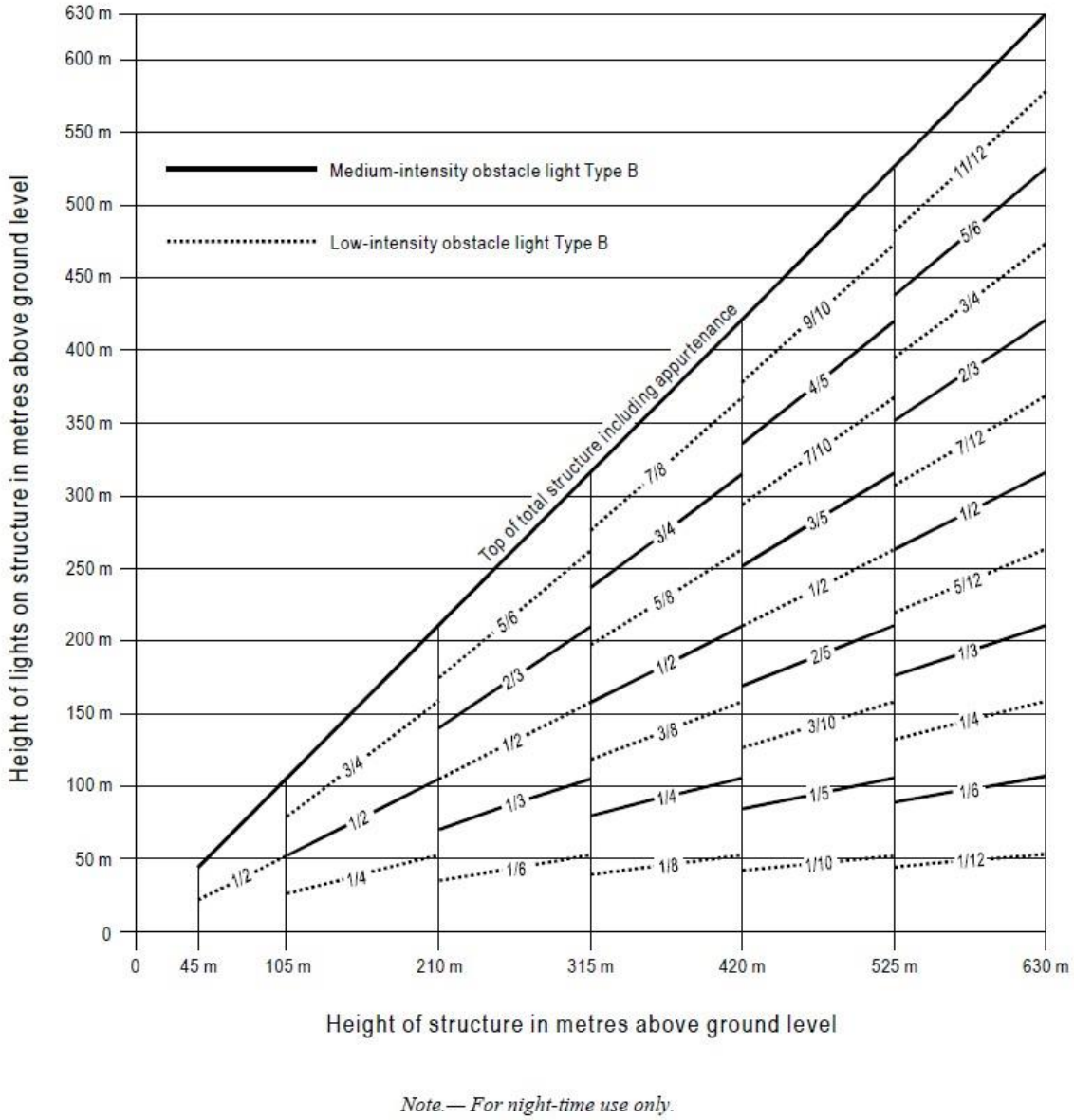
(b) High-intensity obstacle lights are intended for day use as well as night use. Care should be taken to ensure that these lights do not create disconcerting dazzle or environmental concerns. Guidance on the design, location, and operation of high-intensity obstacle lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.



Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

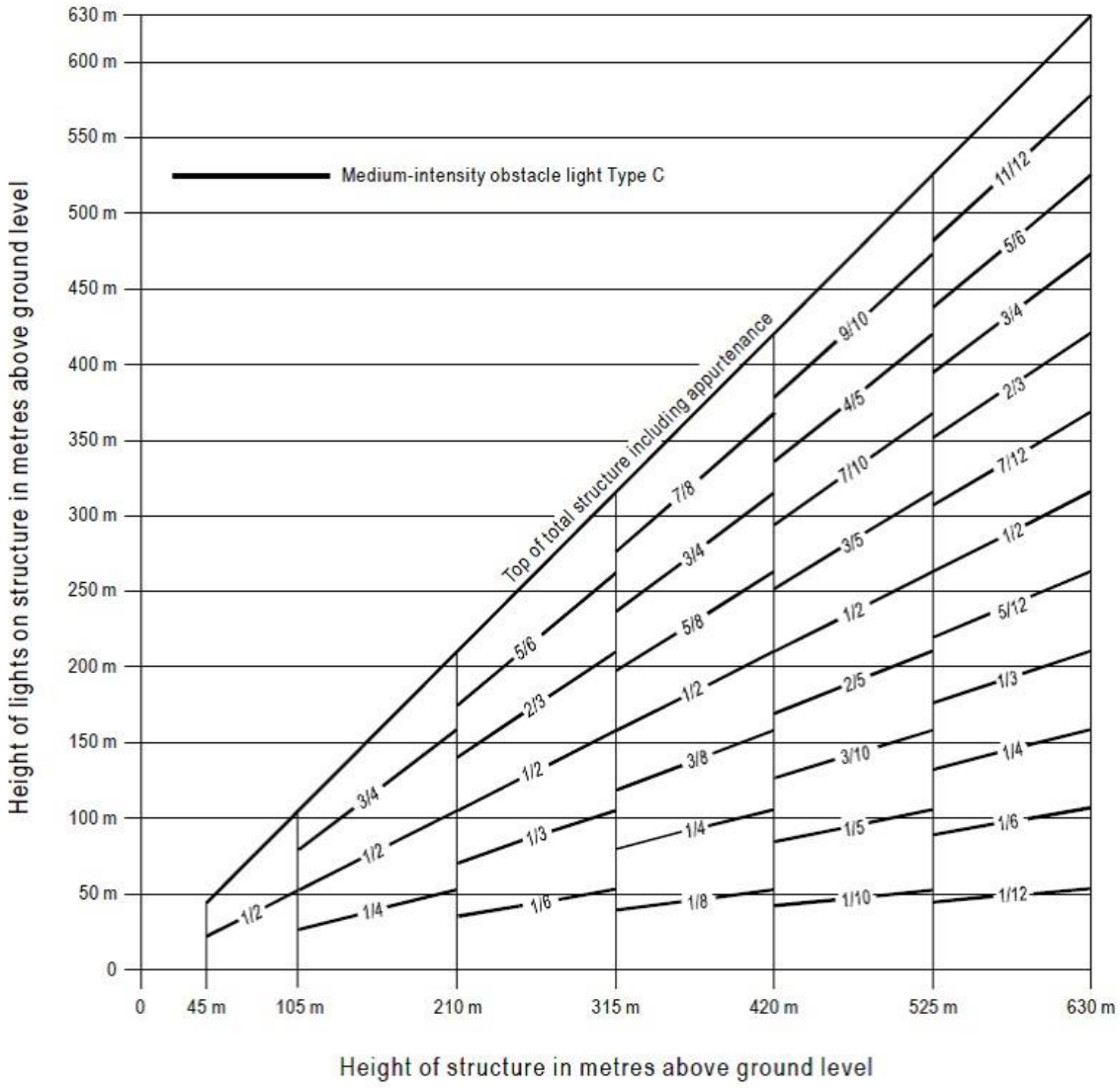
Figure CS-137: Medium-intensity flashing-white obstacle lighting system, Type A

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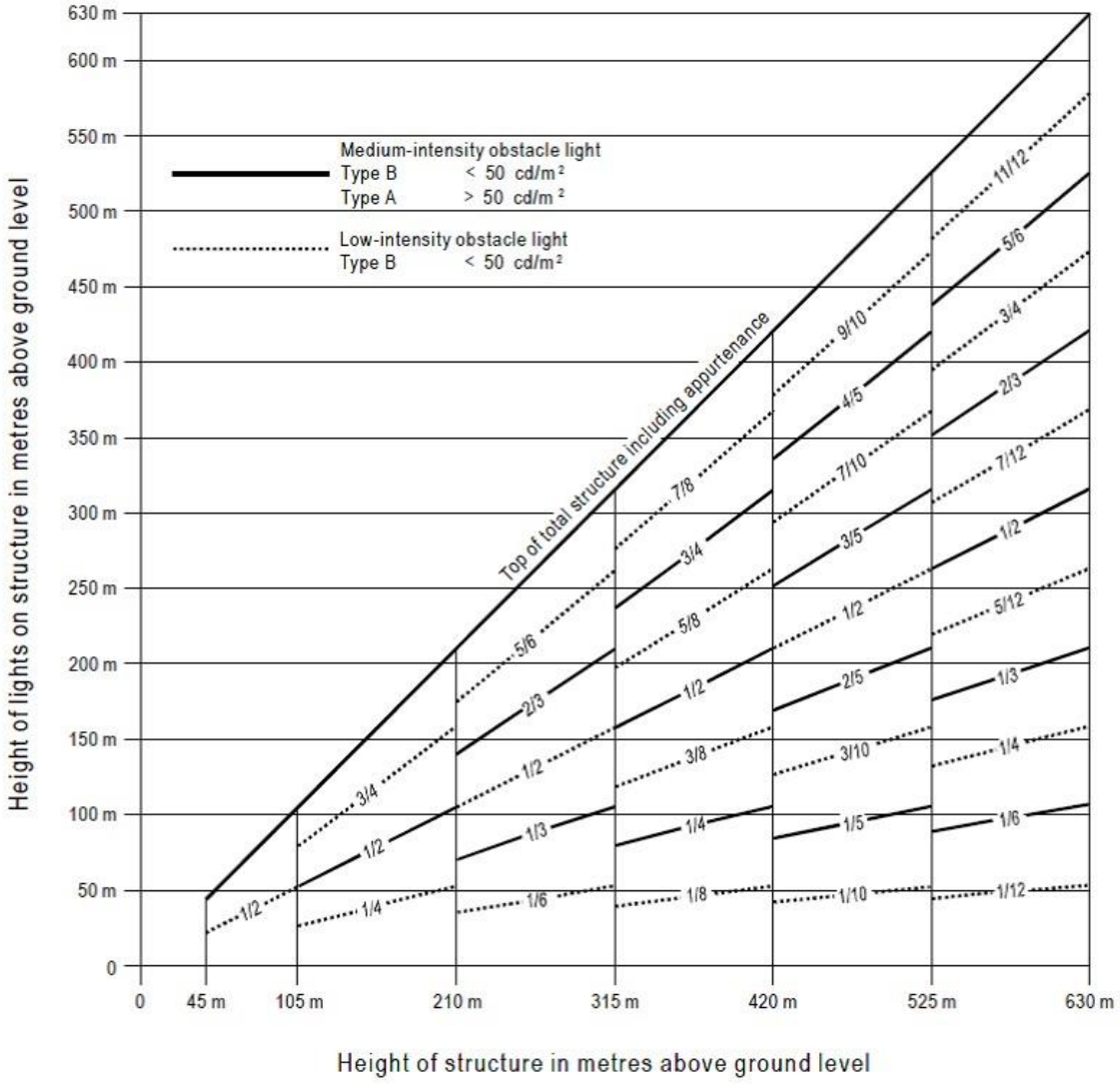
Note.— For night-time use only.

Figure CS-138: Medium-intensity flashing-red obstacle lighting system, Type B



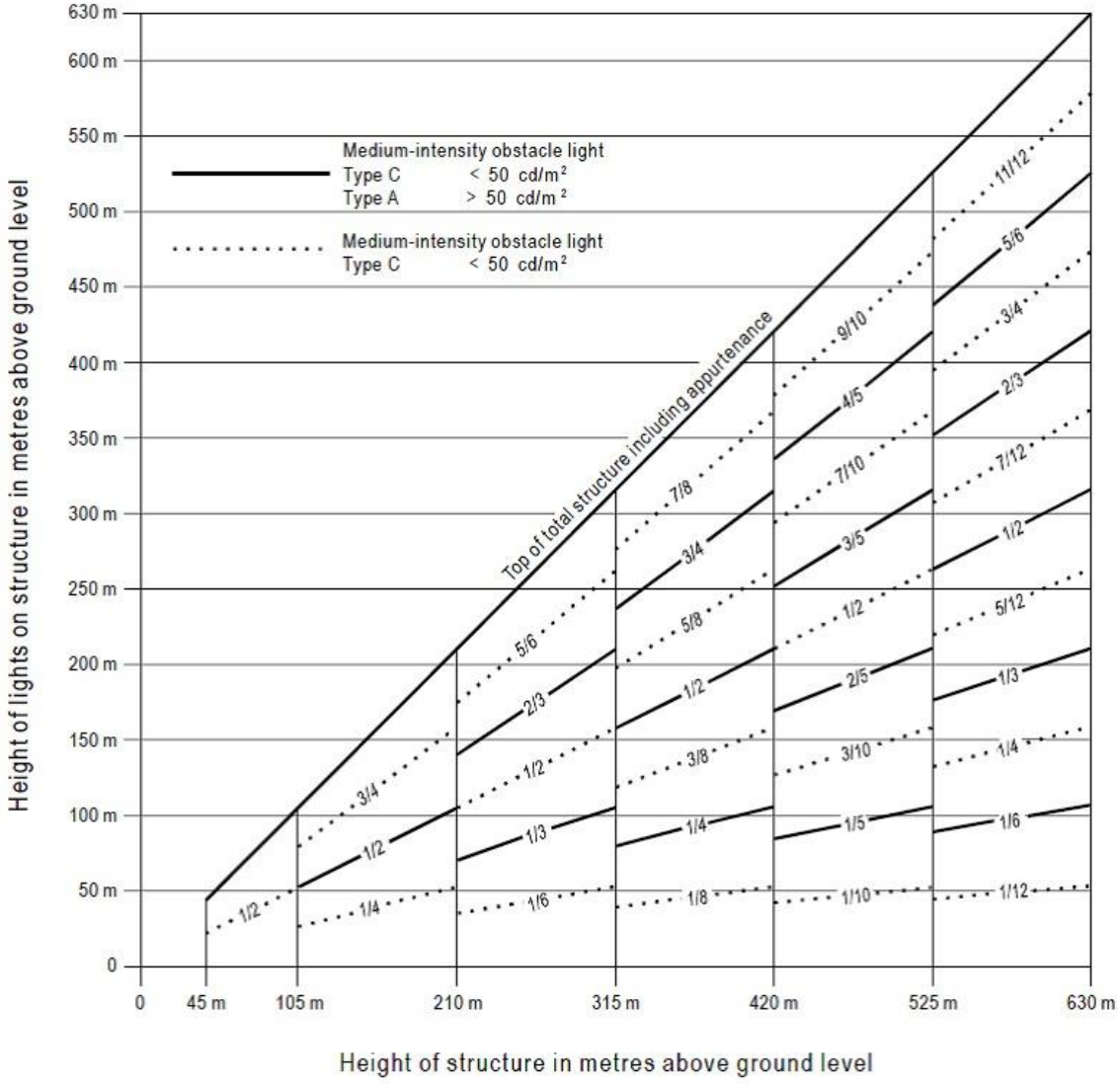
Note.— For night-time use only.

Figure CS-139: Medium-intensity fixed-red obstacle lighting system, Type C



Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure CS-140: Medium-intensity dual obstacle lighting system, Type A/Type B



Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure CS-141: Medium-intensity dual obstacle lighting system, Type A/Type C

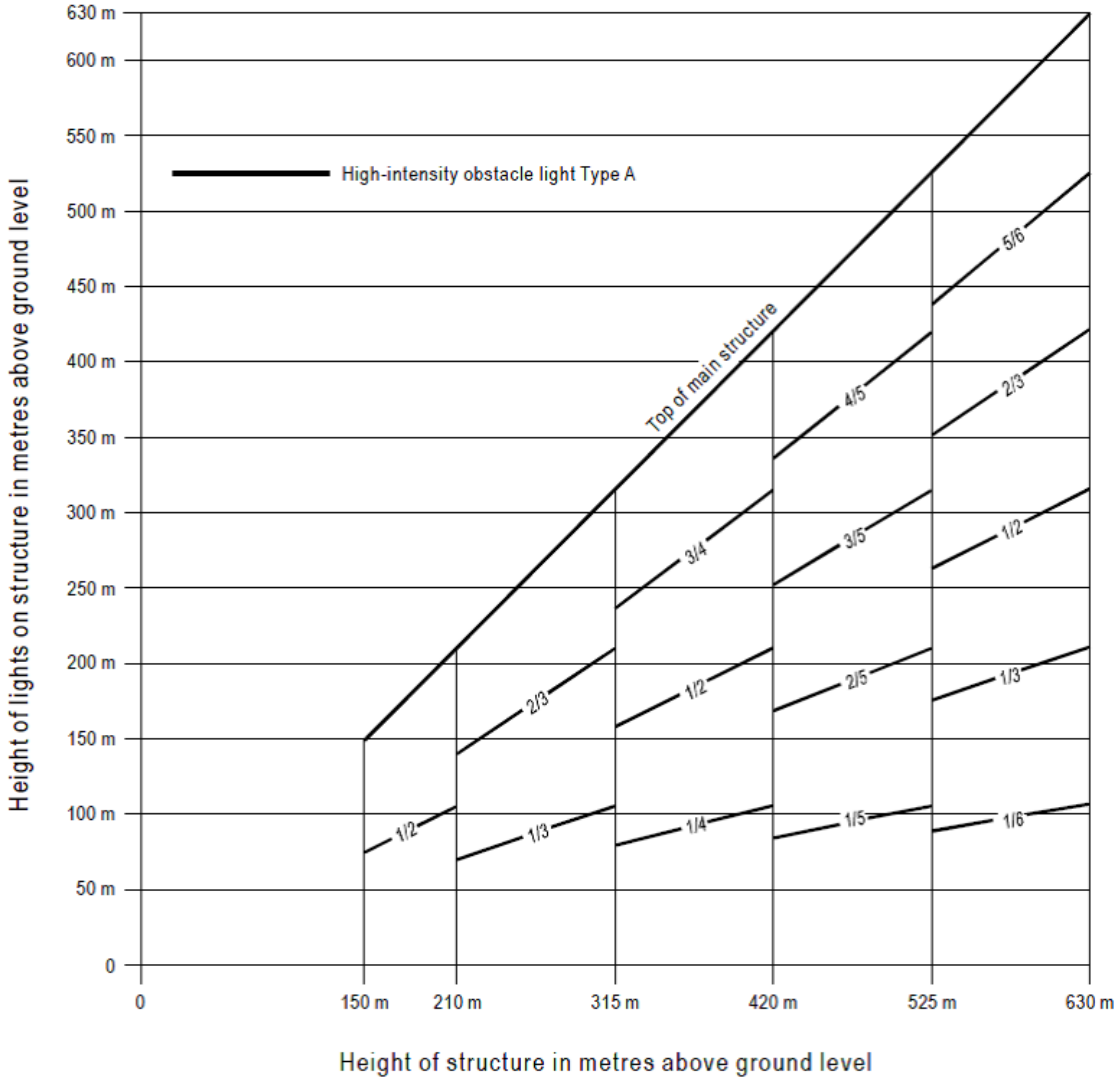


Figure CS-142: High-intensity flashing-white obstacle lighting system, Type A

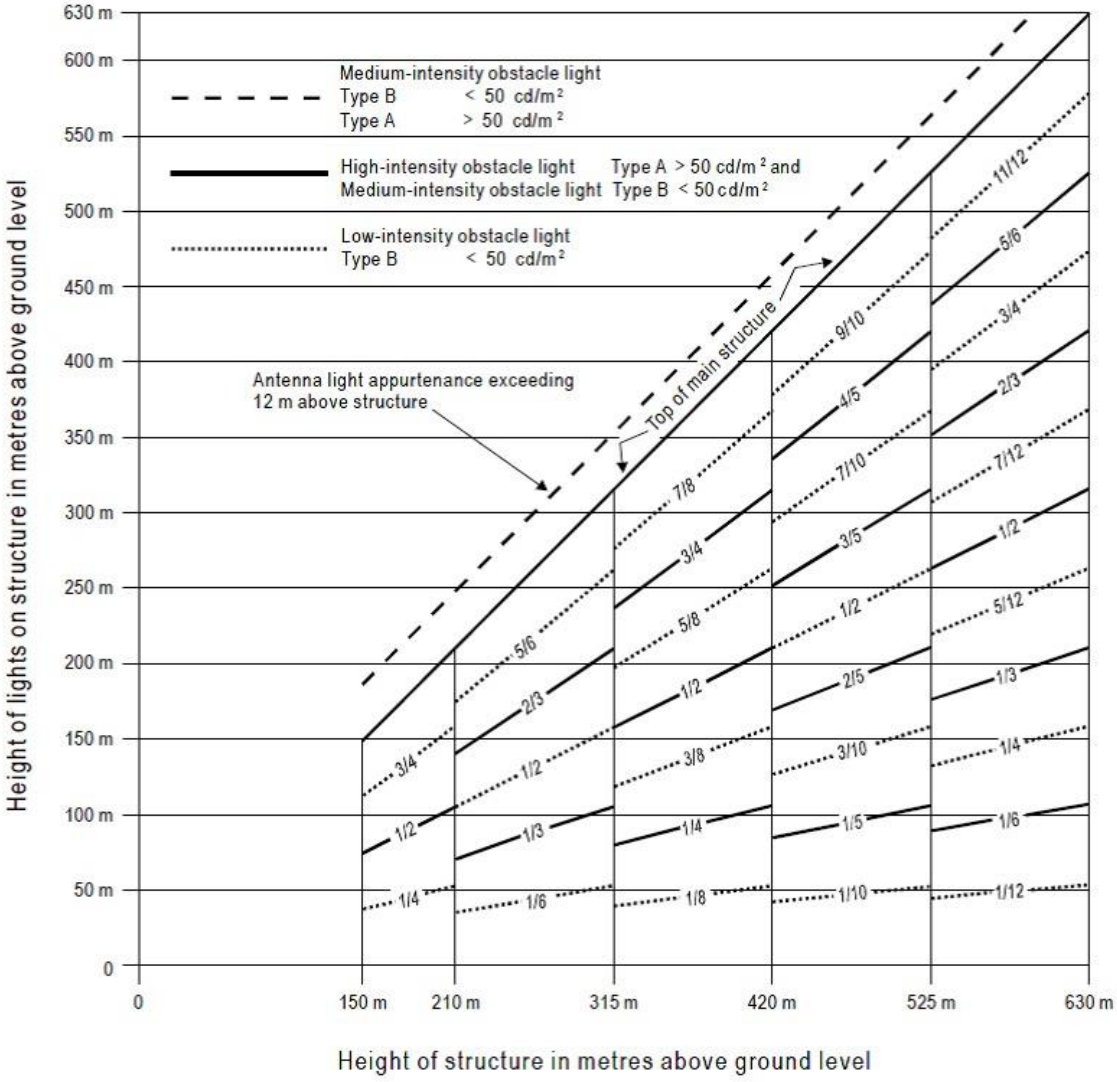


Figure CS-143: High-/medium-intensity dual obstacle lighting system, Type A/Type B

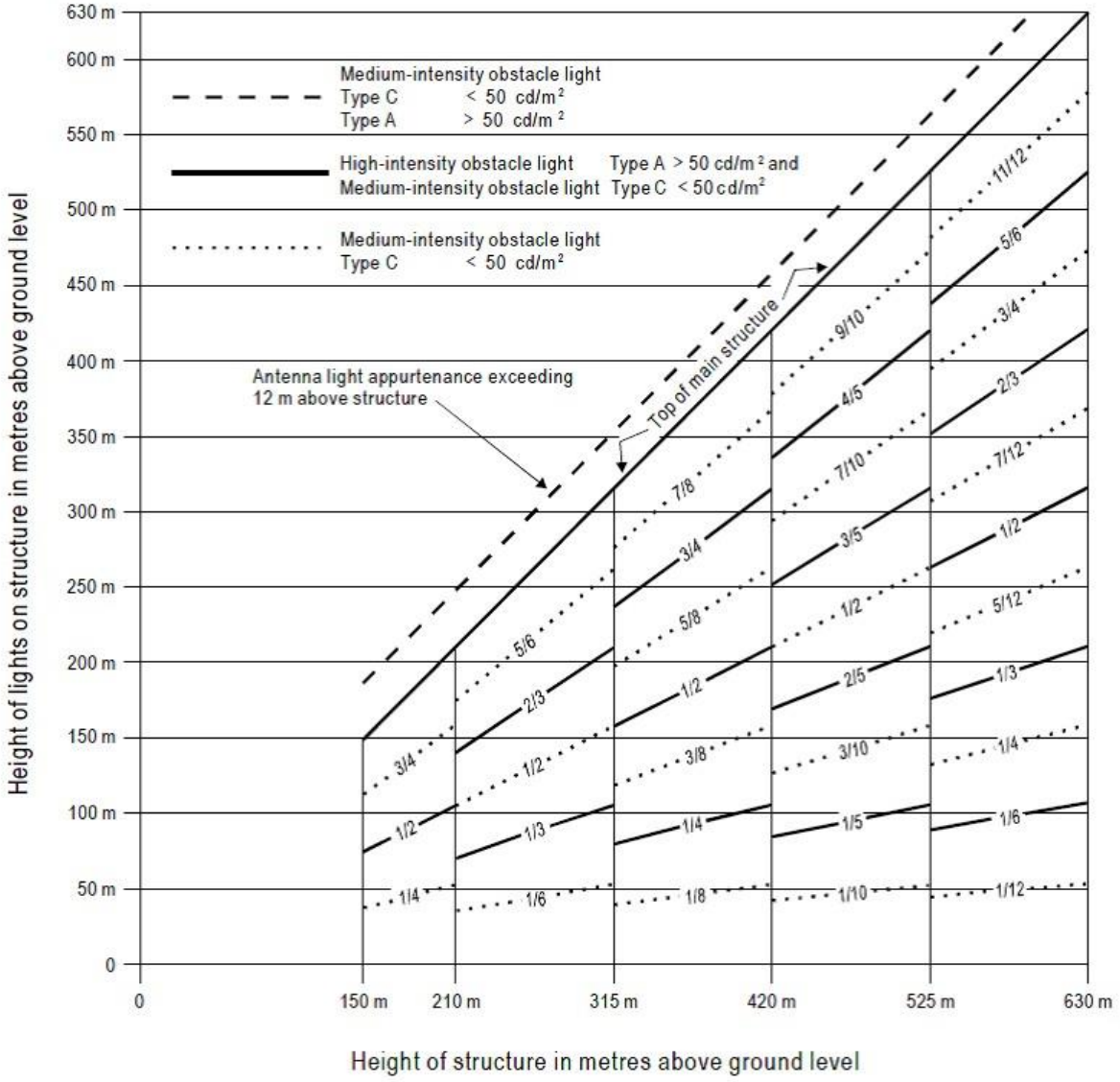


Figure CS-144: High-/medium-intensity dual obstacle lighting system, Type A/Type C

In the cases as stated in CS ADR-DSN.Q.848(c) and (d), normally the spacing would not exceed 52 m.

CS ADR-DSN.Q.847 Lighting of fixed objects with a height less than 45 m above ground level

(a) Low-intensity obstacle lights, Type A or B, should be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.

(b) Where the use of low-intensity obstacle lights, Type A or B, would be inadequate, or an early special warning is required, then medium- or high-intensity obstacle lights shall be used.

(c) Low-intensity obstacle lights, Type B, should be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with subparagraph (d), below.

(d) Medium-intensity obstacle lights, Type A, B, or C, should be used where the object is an extensive one. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

GM1 ADR-DSN.Q.847 Lighting of fixed objects with a height less than 45 m above ground level

A group of buildings is regarded as an extensive object.

CS ADR-DSN.Q.848 Lighting of fixed objects with a height 45 m to a height less than 150 m above ground level

(a) Medium-intensity obstacle lights, Type A, B, or C, should be used where the object is an extensive one. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

(b) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground, or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings as appropriate, with the spacing not exceeding 105 m.

(c) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings as appropriate, with the spacing not exceeding 52 m.

(d) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights

shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(e) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in paragraph CS ADR-DSN.Q.846(d), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

GM1 ADR-DSN.Q.847 Lighting of fixed objects with a height 45 m to a height less than 150 m above ground level

Low-intensity obstacle lights, Type A or B, may be used for obstacles higher than 45 m if it is determined to be sufficient.

CS ADR-DSN.Q.849 Lighting of fixed objects with a height 150 m or more above ground level

(a) High-intensity obstacle lights, Type A, shall be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(b) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in CS ADR-DSN.Q.846(d), except where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

(c) Where an object is indicated by medium-intensity obstacle lights, Type A, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.

(d) Where an object is indicated by medium-intensity obstacle lights, Type B, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(e) Where an object is indicated by medium-intensity obstacle lights, Type C, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(f) Where, in the opinion of the appropriate authority, the use of high-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, medium-intensity obstacle lights, Type C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

CS ADR-DSN.Q.851 Marking and lighting of wind turbines

(a) Applicability: When considered as an obstacle a wind turbine shall be marked and/or lighted.

(b) Marking: The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines shall be painted white, or if after an aeronautical study, it is determined that other colour will improve safety.

(c) Lighting:

(1) Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with paragraph (c)(2)(v) below, or as determined by an aeronautical study.

(2) When lighting is deemed necessary in the case of a wind farm (i.e. a group of two or more wind turbines), the wind farm should be regarded as an extensive object and lights shall be installed:

(i) to identify the perimeter of the wind farm;

(ii) respecting the maximum spacing, in accordance with CS ADR-DSN.Q.846(i), between the lights along the perimeter, or if after a safety assessment, it is determined that a greater spacing can be used;

(iii) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;

(iv) so that, within a wind farm, any wind turbines of significantly higher elevation are

also identified wherever they are located; and

(v) at locations prescribed in (i), (ii) and (iv):

(A) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium intensity lighting on the nacelle;

(B) for wind turbines from 150 m to 315 m in overall height, in addition to the medium intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light; the lights should be installed to assure that the output of either light is not blocked by the other;

(C) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low intensity Type E lights, as specified in CS ADR-DSN.Q.846(c), that are configured to flash at the same rate as the light on the nacelle; low-intensity Type A or B lights may be used if an safety assessment shows that low intensity Type E lights are not suitable.

(3) The obstacle lights shall be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

GM1 ADR-DSN.Q.851 Marking and lighting of wind turbines

(a) Additional markings and lighting may be provided to the wind turbines if indicated by a safety assessment.

(b) For wind turbines of more than 315 m of overall height, additional marking and lighting may be required as determined by an aeronautical study. Case by case studies for wind turbines of more than 315 m of overall height may conclude that additional markings and lighting are required.

CS ADR-DSN.Q.852 Marking and lighting of overhead wires, cables, supporting towers, etc.

(a) Marking: The wires, cables, etc. to be marked shall be equipped with markers; the supporting tower shall be coloured.

(b) Marking by colours: The supporting towers of overhead wires, cables, etc. that require marking should be marked in accordance with CS ADR-DSN.Q.845(b), except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by

day.

(c) Marking by markers:

(1) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be Recognisable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased.

(2) A marker displayed on an overhead wire, cable, etc., should be spherical and have a diameter of not less than 60 cm.

(3) The spacing between two consecutive markers, or between a marker and a supporting tower, should be appropriate to the diameter of the marker. The spacing should normally not exceed:

(i) 30 m where the marker diameter is 60 cm, increasing progressively with increase of the marker diameter to:

(ii) 35 m where the marker diameter is 80 cm; and

(iii) further progressive increases to a maximum of 40 m where the marker diameter is of at least 130 cm.

Where multiple wires, cables, etc., are involved, a marker should be located not lower than the level of the highest wire at the point marked.

(4) A marker should be of one colour. When installed, white and red, or white and orange, markers should be displayed alternately. The colour selected shall contrast with the background against which it should be seen.

(5) When it has been determined that an overhead wire, cable, etc., needs to be marked but it is not practicable to install markers on the wire, cable, etc., then high-intensity obstacle lights, Type B, should be provided on their supporting towers.

(d) Lighting:

(1) High-intensity obstacle lights, Type B, should be used to indicate the presence of the tower supporting overhead wires, cables, etc. where:

(i) an aeronautical study indicates such light to be essential for the recognition of the presence of wires, cables, etc.; or

(ii) it has not been found practicable to install marker on the wires, cables, etc.

(2) Where high-intensity obstacle lights, Type B, are used, they shall be located at three levels:

(i) at the top of the tower;

(ii) at the lowest level of the catenary of the wires or cables; and

(iii) at approximately midway between these two levels.

(3) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., should flash sequentially; first the middle light, second the top light, and last the bottom light. The intervals between flashes of the lights should approximate the following ratios:

Flash interval between	Ratio of cycle time
Middle and top light	1/13
Top and bottom light	2/13
Bottom and middle light	10/13

Table CS-72: The intervals between flashes of the lights

(4) The installation setting angles for high-intensity obstacle lights, Types B, should be in accordance with Table CS-65.

(5) Where, in the opinion of the Appropriate Authority, the use of high-intensity obstacle lights, Type B, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, a dual obstacle lighting system should be provided. This system should be composed of high-intensity obstacle lights, Type B, for daytime and twilight use and medium-intensity

obstacle lights, Type B, for night-time use. Where medium-intensity lights are used they should be installed at the same level as the high-intensity obstacle light Type B.

GM1 ADR-DSN.Q.852 marking and lighting of overhead wires, cables, support towers, etc.

(a) Where high-intensity obstacle lights, Type B, are used, and it is not possible to locate them as described in CS ADR-DSN.Q.852(d)(2), in some cases, this may require locating the lights off the tower.

(b) High-intensity obstacle lights are intended for day use as well as night use. Care should be taken to ensure that these lights do not create disconcerting dazzle or environmental concerns. Guidance on the design, location, and operation of high-intensity obstacle lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Light type	Colour	Signal type/ (Flash Rate)	Peak intensity (cd) at given Background Luminance (b			Light Distributior Table
			Day (Above500 cd/m2)	Twilight (50-500 cd/m2)	Night (Below 50 cd/m2)	
Low-intensity Type A (fixed obstacle)	Red	Fixed	N/A	N/A	10	Table CS-61
Low-intensity Type B (fixed obstacle)	Red	Fixed	N/A	N/A	32	Table CS-61
Low-intensity TypeC(mobile obstacle)	Yellow/Amber/ Blue (a)	Flashing (60-90 fpm)	N/A	40	40	Table CS-61
Low-intensity Type D (follow-me vehicle	Yellow/Amber	Flashing (60-90 fpm)	N/A	200	200	Table CS-61
Low-intensity, Type E	Red	Flashing (c)	N/A	N/A	32	Table CS-61 (Type B)
Medium-intensity Type A	White	Flashing (20-60 fpm)	20 000	20 000	2 000	Table CS-62
Medium-intensity Type B	Red	Flashing (20-60 fpm)	N/A	N/A	2 000	Table CS-62
Medium-intensity Type C	Red	Fixed	N/A	N/A	2 000	Table CS-62
High-intensity Type A	White	Flashing (40-60 fpm)	200 000	20 000	2 000	Table CS-62
High-intensity Type B	White	Flashing (40-60 fpm)	100 000	20 000	2 000	Table CS-62

(a) CS ADR-DSN.Q.850(b)

(b) For flashing lights, effective intensity as determined in accordance with ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(c) For wind turbine application, to flash at the same rate as the lighting on the nacelle.

Table CS-73: Characteristics of obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10°	5 cd
Type B	32 cd (b)	N/A	10°	16 cd
Type C	40 cd (b)	400 cd	12(d)	20 cd
Type D	200 cd (c)	400 cd	N/A(e)	N/A

This table does not include recommended horizontal beam spreads. CS ADR-DSN.Q.846(c) requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

(a) 360° horizontal. For flashing lights, the intensity is read into effective intensity, as determined in accordance with ICAO, Aerodrome Design Manual, Part 4, Visual Aids.

(b) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.

(c) Between 2 and 20° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.

(d) Peak intensity should be located at approximately 2.5° vertical.

(e) Peak intensity should be located at approximately 17° vertical.

(f) Beam spread is defined as the angle between the horizontal plan and the directions for which the intensity exceeds that mentioned in the 'intensity' column.

Table CS-74: Light distribution for low-intensity obstacle lights

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical beam spread (c)		Vertical elevation angle (b)			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Minimum average	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

This table does not include recommended horizontal beam spreads. CS ADR-DSN.Q.846(c) requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

(a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity, as determined in accordance with ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(b) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.

(c) Beam spread is defined as the angle between the horizontal plan and the directions for which the intensity exceeds that mentioned in the 'intensity' column.

Table CS-75: Light distribution for medium- and high-intensity obstacle lights according to benchmark intensities of Table CS-61

Longest dimension		Band width
Greater than	**Not exceeding**	
1.5 m	210 m	1/7 of longest dimension
210 m	270 m	1/9 of longest dimension
270 m	330 m	1/11 of longest dimension
330 m	390 m	1/13 of longest dimension
390 m	450 m	1/15 of longest dimension
450 m	510 m	1/17 of longest dimension
510 m	570 m	1/19 of longest dimension
570 m	630 m	1/21 of longest dimension

Table CS-76: Marking band widths

Height of light unit above terrain (AGL)		Angle of the peak of the beam above the horizontal
Greater than	Not exceeding	
151 m		0°
122 m	151 m	1°
92 m	122 m	2°
	92 m	3°

Table CS-77: Installation setting angles for high-intensity obstacle lights

CHAPTER R — VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

CS ADR-DSN.R.855 Closed runways and taxiways, or parts thereof

(a) Applicability: A closed marking shall be displayed on a runway, or taxiway, or portion thereof which is permanently closed to the use of all aircraft.

(b) A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

(c) Location of closed markings: On a runway, a closed marking shall be placed at each end of the runway, or portion thereof, declared closed, and additional markings shall be so placed that the maximum interval between markings does not exceed 300 m. On a taxiway a closed marking shall be placed at least at each end of the taxiway or portion thereof closed.

(d) Characteristics of closed markings: The closed marking shall be of the form and proportions as detailed in Figure CS-145, Illustration (a), when displayed on a runway, and shall be of the form and proportions as detailed in Figure CS-146, Illustration (b), when displayed on a taxiway. The marking shall be white when displayed on a runway and shall be yellow when displayed on a taxiway.

(e) When a runway, or taxiway, or portion thereof is permanently closed, all normal runway and taxiway markings~~.~~ shall be obliterated.

(f) Airfield lighting on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.

(g) In addition to closed markings, when the runway, or taxiway, or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights shall be placed across the entrance to the closed area at intervals not exceeding 3 m (see CS ADR-DSN.R.870(c)(2)).

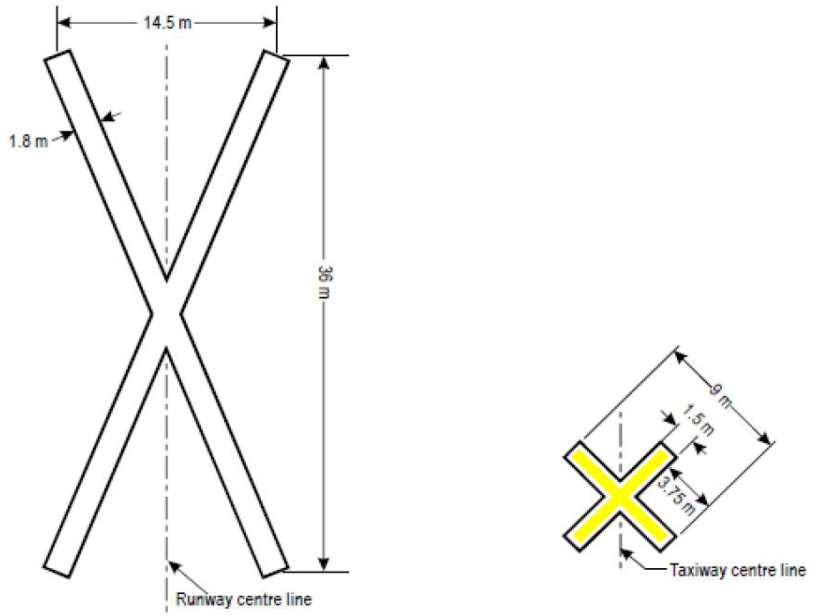


Illustration a) Closed runway marking

Illustration b) Closed taxiway marking

Figure CS-147: Runway and taxiway closed markings

GM.ADR-DSN.R.855 Closed runways and taxiways, or parts thereof

(a) Information regarding the physical removal of runway and taxiway markings is contained in AMC1 ADR.OPS.C.015(d) and GM1 ADR.OPS.C.015(d).

(b) When an area is temporarily closed, frangible barriers or markings utilizing materials other than paint or other suitable means may be used to identify the closed area.

(c) Procedures pertaining to the planning, coordination, monitoring and safety management of works in progress on the movement area are specified in the PANS-Aerodromes (Doc 9981).

CS ADR-DSN.R.860 Non-load-bearing surfaces

(a) Shoulders for taxiways, runway turn pads, holding bays and aprons, and other non-load-bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft, shall have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking.

(b) A taxi side stripe marking shall be placed along the edge of the load-bearing pavement, with the outer edge of the marking approximately on the edge of the load-bearing pavement.

(c) A taxi side stripe marking shall consist of a pair of solid lines, each 15 cm wide and spaced 15

cm apart, and the same colour as the taxiway centre line marking.

GM1 ADR-DSN.R.860 Non-load-bearing surfaces

(a) where, due to turning, the possibility for confusion between the side stripe markings and centre line markings may exist, or where the pilot may not be sure on which side of the edge marking the non-load bearing pavement is, the additional provision of transverse stripes on the non-load bearing surface has been found to be of assistance.

(b) As shown in Figure CS-148, the transverse stripes should be placed perpendicular to the side stripe marking.

(c) On curves, a stripe should be placed at each point of tangency of the curve and at intermediate points along the curve so that the interval between stripes does not exceed 15 m. If deemed desirable to place transverse stripes on small straight sections, the spacing should not exceed 30 m.

(d) The width of the marks should be 0.9 m, and they should extend to within 1.5 m of the outside edge of the stabilised paving or be 7.5 m long whichever is shorter. The colour of the transverse stripes should be the same as that of the edge stripes, i.e. yellow.

(e) More guidance on providing additional transverse stripes at an intersection or a small area on the apron is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

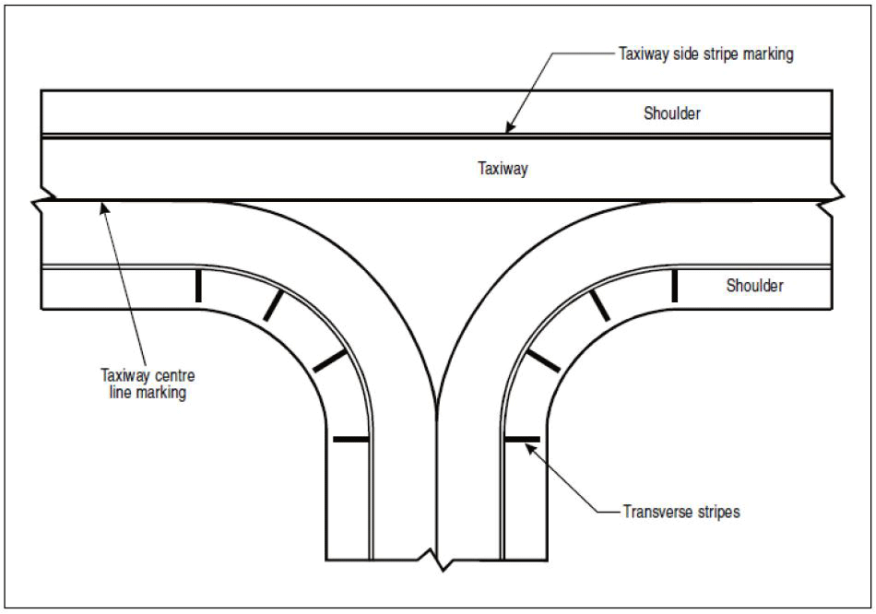


Figure CS-149: Marking of non-load bearing paved taxiway surface

CS ADR-DSN.R.865 Pre-threshold area

(a) Applicability of Pre-threshold area: When the surface before a threshold is paved and exceeds 60 m in length, and is not suitable for normal use by aircraft, the entire length before the threshold shall be marked with a chevron marking.

(b) Location: A chevron marking shall point in the direction of the runway and be placed as shown in Figure CS-150.

(c) Characteristics: A chevron marking shall be of conspicuous colour and contrast with the colour used for the runway markings; it should preferably be yellow and shall have an overall width of at least 0.9 m.

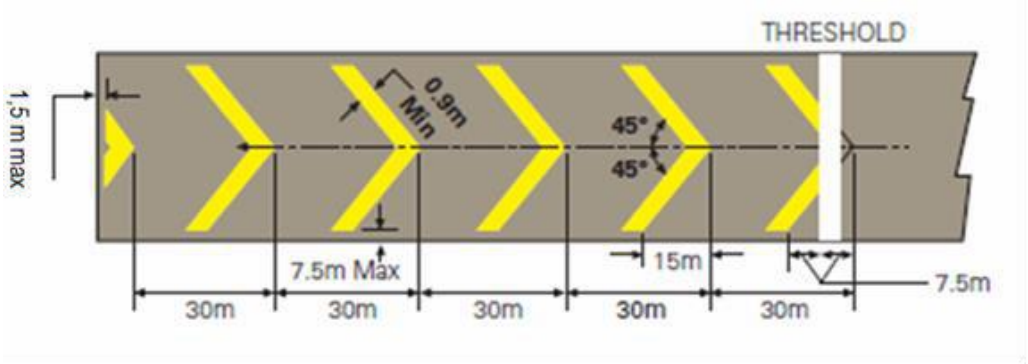


Figure CS-151: Pre-threshold area marking

GM1 ADR-DSN.R.865 Pre-threshold area

For pre-threshold areas shorter than 60 m, markings may be modified or reduced in size so as to present the correct picture to aircrew.

CS ADR-DSN.R.870 Unserviceable areas

(a) Applicability of unserviceability markers and lights: Unserviceability markers / lights shall be displayed wherever any portion of a taxiway, apron, or holding bay is declared unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights shall be used. Unserviceability lights shall be displayed to delineate an area unsafe for aircraft operation, i.e. closed areas, areas temporarily unserviceable.

(b) Location: Unserviceability markers and lights shall be positioned at the outer perimeter of an Unserviceable Area, or at the entry to the taxiway/ aircraft stand as appropriate. Unserviceability markers and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area.

A minimum of four lights shall be used except whether the area is triangular in shape where a minimum of three lights may be employed.

The number of lights must be increased where the area is large or of unusual configuration.

If the lights are directional, they shall be orientated so that as far as possible their beams are aligned from the direction which aircraft or vehicles are approaching.

In addition to closed markings, when a runway or taxiway, or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights should be placed across the entrance to the closed area at intervals not exceeding 3 m.

(c) Characteristics:

(1) Unserviceability markers shall consist of conspicuous upstanding devices such as flags, cones, or marker boards.

(2) An unserviceability light shall consist of a red fixed light. The light shall have intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case shall the intensity be less than 10 cd of red light.

(3) Unserviceable area lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

(4) If the lights are directional, they shall be orientated so that as far as possible, their beams are aligned in the direction from which aircraft or vehicles should approach.

(5) An unserviceability cone shall be at least 0.5 m in height and red, orange, or yellow, or any one of these colours in combination with white.

(6) An unserviceability flag shall be at least 0.5 m square and red, orange, or yellow, or any one of these colours in combination with white.

(7) An unserviceability marker board shall be at least 0.5 m in height and 0.9 m in length, with alternate red and white, or orange and white vertical stripes.

GM1 ADR-DSN.R.870 Unserviceable areas

(a) Unserviceability markers and lights are used for such purposes as warning pilots of a hole in a taxiway, or apron pavement, or outlining a portion of pavement, such as on an apron, that is under repair. They are not suitable for use when a portion of a runway becomes unserviceable, nor on a taxiway when a major portion of the width becomes unserviceable. In such instances, the runway or taxiway is normally closed.

(b) The spacing required for marking and lights should take into account visibility conditions, geometric configurations of the area, potential height differences of terrain so that the limits of unserviceable area is readily visible to pilot.

(c) Where a temporarily unserviceable area exists, it may be marked with fixed-red lights. These lights mark the most potentially dangerous extremities of the area.

(d) A minimum of four such lights may be used, except where the area is triangular in shape, in which case a minimum of three lights may be used.

(e) The number of lights may be increased when the area is large or of unusual configuration. At least one light should be installed for each 7.5 m of peripheral distance of the area.

(f) Where aircraft or vehicles should normally approach from several directions, consideration should be given to adding extra lights or using omnidirectional lights to show the area from these directions.

(g) Procedures pertaining to the planning, coordination, monitoring and safety management of works in progress on the movement area are specified in the PANS-Aerodromes (Doc 9981).

CS ADR-DSN.R.871 Unserviceable areas - lights for temporary closure of runway

A lighted visual aid may be utilized to indicate the temporary closure of a runway instead of closure markings. Where installed the lighted visual aid unit should comply with the following:

(a) Be a portable, towable unit that can be quickly removed from the runway.

(b) Consist of clear incandescent lamps or transmit a white colour, arranged in the shape of a letter "x" with arms crossed at an appropriate angle to make the "x" discernible. The arms should be painted white or yellow on all sides so that the unit will be clearly visible when in its position. The arms must be at least 4.5 m in length with a minimum of 9 x equally spaced 150 W spot lights.

(c) It should be energized by a portable power supply.

(d) It shall be controlled so that the lighted signal will flash at an approximate rate of 2.5-3 seconds "on" and 1-2.5 seconds "off".

(e) It should provide the following daytime visual reference during VFR conditions when placed on the centre line at the threshold markings.

(f) Visible to the pilot at a range of at least 5 nm.

(g) Recognisable as a letter "x" from a range of at least 1- 2 nm.

(h) It should provide lamp dimming capability for night time operations.

(i) It should produce a signal that provides a horizontal coverage to at least 15 degrees on each side of the runway centre line, and a vertical coverage from 0 degrees to 10 degrees above horizontal, both day and night, at a range of 0.5 nm.

(j) It should have adjustable aiming and levelling to allow tilting to an optimum angle of 3 degrees from vertical.

(k) It should be able to withstand wind speeds of 40 kts without affecting aiming or operation.

(l) A minimum of two units should be located on the runway. One should be located on the centre line at the threshold of the runway in use, and another located at the aiming point 350-400 m from the threshold. All other airfield lighting associated with the runway should be extinguished in association with the use of these units.

CHAPTER S — ELECTRICAL SYSTEMS

CS ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

(a) Adequate primary power supply shall be available at aerodromes for the safe functioning of air navigation facilities.

(b) The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure should not leave the pilot with inadequate visual and non-visual guidance, or misleading information.

(c) Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(d) The time interval between failure of the primary source of power and the complete restoration of the services required by CS ADR-DSN.S.880(d) should be as short as practicable, except that for visual aids associated with non-precision, precision approach, or take-off runways the requirements of Table CS-66 for maximum switch-over times shall apply.

GM1 ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

(a) The safety of operations at aerodromes depends on the quality of the supplied power. The total electrical power supply system may include connections to one or more external sources of electric power supply, one or more local generating facilities, and to a distribution network including transformers and switchgear. Many other aerodrome facilities supplied from the same system need to be taken into account while planning the electrical power system at aerodromes.

(b) The design and installation of the electrical systems need to take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, etc. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

(c) Switch-over time is the time required for the actual intensity of a light measured in a given direction to fall from 50 % and recover to 50 % during a power supply changeover, when the light is being operated at intensities of 25 % or above.

(d) As a good practice, a measurement of the photometric parameters may be used for the

evaluation of the switch-over time.

(1) If the switch-over time is greater than 1 second, the following corrective actions may be used to decrease the switch-over time:

(i) use of enhanced constant current regulators (CCR); or

(ii) use of uninterruptible power supply (UPS).

(2) If the photometric based switch-over time is below or equal 1 second, it is recommended to analyse the electrical system in order to find out an equivalent electrical switch-over time.

(e) For periodic measurement of the switch-over time a measurement of the equivalent electrical switch-over time at the feeding point of an aeronautical ground lights (AGL) system may be established.

(f) Specifications for electrical power management for radio navigation aids and ground elements of communications systems are provided in CAR ANS Part CNS.

(g) Guidance on electrical systems is included in the Aerodrome Design Manual (Doc 9157), Part 5.

CS ADR-DSN.S.880 Electrical power supply systems

(a) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table CS-66 for the appropriate category of precision approach runway shall be provided. Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(b) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table CS-66 shall be provided.

(c) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table CS-66 should be provided except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.

(d) At an aerodrome where the primary runway is a non-instrument Runway a secondary power

supply capable of meeting the requirements of Table CS-66 shall be provided except that a secondary power supply for visual aids need not be provided when an emergency lighting system in accordance with the specification of CS ADR-DSN.M.616 is provided and capable of being deployed in 15 minutes.

(e) The following aerodrome facilities shall be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

(1) the signaling lamp, voice communication management system and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

(2) obstacle lights which in the opinion of the appropriate authority are essential to ensure the safe operation of aircraft;

(3) essential equipment and facilities for the aerodrome responding emergency agencies

(4) approach, runway and taxiway lighting as specified in CS ADR-DSN.M.625 to CS ADR-DSN.M.745;

(5) radio navigation aids and ground elements of communication systems

(6) meteorological equipment;

(7) essential equipment and facilities for the parking position if provided, in accordance with CS ADR-DSN.M.750(a) and CS ADR-DSN.M.755(a); and

(8) illumination of apron areas over which over which passenger aircraft are being handled;

passengers may walk

(9) essential security equipment including but not necessarily limited to access control facilities, security screening equipment, lighting; and

(10) floodlighting on a designated isolated aircraft parking positions if provided.

(f) Requirements for a secondary power supply shall be met by either of the following:

(a) independent public power which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or

(b) standby power unit(s) which are engine generators, batteries, etc. from which electric power can be obtained.

(c) The time interval between failure of the primary source of power and the complete restoration of the services should be as short as practicable, except that for visual aids associated with non-precision, precision approach or take-off runways the requirements of below table for maximum Switch-over Times should apply.

Runway	**Lighting aids requiring power**	**Maximum switch-over time**
Non-instrument	Visual approach slope indicators[a] . Runway edge[b]. Runway threshold[b] . Runway end[b]. Obstacle[a]. Stopway end and edge.	15 seconds
Non-precision approach	Approach lighting system. Visual approach slope indicators[a, d]. Runway edge[d] . Runway threshold[d] . Runway end . Obstacle[a]. Stopway end and Stopway edge.	15 seconds

Precision approach Category I	Approach lighting system. Runway edge[d.] Visual approach slope indicators[a, d.] Runway threshold[d .] Runway end. Essential taxiway[a .] Obstacle[a] Stopway end and Stopway edge	15 seconds
Precision approach Category II/III	Inner 300 m of the approach lighting system. Other parts of the approach lighting. System. Obstacle[a.] Runway edge. Runway threshold. Runway end. Runway centre line. Runway touchdown zone. Runway guard lights. All stop bars. Essential taxiway. Stopway end. Stopway edge.	1 second 15 seconds 15 seconds 15 seconds 1 second 1 second 1 second 1 second 15 seconds 1 second 15 seconds 1 second 15 seconds

Runway meant for take-off in runway visual range conditions less than a value of 800 m	Runway edge Runway end. Runway centre line. All stop bars. Essential taxiway[a] Obstacle[a]. Stopway end. Stopway edge.	15 seconds 1 second 1 second 1 second 15 seconds 15 seconds 1 second 15 seconds

a. Supplied with secondary power when their operation is essential to the safety of flight operation.

b. The use of emergency lighting should be in accordance with any procedures established.

c. One second where no runway centre line lights are provided.

d. One second where approaches are over hazardous or precipitous terrain.

Table CS-78: Secondary power supply requirements (see CS ADR-DSN.S.875(d))

GM1 ADR-DSN.880 Electrical power supply

(a) Specifications for secondary power supply for radio navigation aids and ground elements of communications systems are given in ICAO Annex 10, Volume I, Aeronautical Telecommunications, Chapter 2.

(b) Guidance on electrical systems is included in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

CS ADR-DSN.S.885 Electrical system design

(a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting, and control of the lighting systems included in Table CS-66 shall be so designed that an equipment failure will not leave the pilot with inadequate visual guidance or misleading information.

(b) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies shall be physically and electrically separate so as to ensure the required level of

availability and independence.

(c) Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems shall be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

GM1 ADR-DSN.S.885 Electrical system design

Guidance on means of providing this protection is given in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

CS ADR-DSN.S.890 Monitoring of lighting system

(a) A system of monitoring shall be employed to indicate the operational status of the lighting systems.

(b) Where lighting systems are used for aircraft control purposes, such systems shall be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information should be automatically relayed to the air traffic service unit.

(c) Where a change in the operational status of lights has occurred, an indication shall be provided within two seconds for a stop bar at a runway-holding position and within five seconds for all other types of visual aids.

(d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table CS-66 shall be monitored automatically so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in ADR.OPS.C.015 (b)(1) to (b)(7). This information shall be automatically relayed to the maintenance department.

(e) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table CS-66 shall be monitored automatically to provide an indication when the serviceability level of any element falls below a minimum level, below which operations shall not continue. This information shall be automatically relayed to the aerodrome maintenance department and air traffic services unit and displayed in a prominent position.

GM1 ADR-DSN.S.890 Monitoring

Additional guidance on air traffic control interface and visual aids monitoring is given in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

CS ADR-DSN.T.900 Emergency access and service roads

Emergency access roads and service roads shall be equipped with a road-holding position, in accordance with CS ADR-DSN.L.600, CS ADR-DSN.M.770 and CS ADR-DSN.N.800, as appropriate, at all intersections with runway and taxiways.

GM1 ADR-DSN.T.900 Emergency access and service roads

(a) Service roads at air side are installed to support all apron processes. Furthermore, service roads can be used as aerodrome perimeter service roads, providing access to navigation aids, as temporary roads for construction vehicles, etc.

(b) Some general considerations in the planning of roads are described as follows:

(1) Every effort should be made to plan service roads at air side so that they do not cross runways and taxiways.

(2) The planning of the aerodrome road layout should take into account the need to provide emergency access roads for use by rescue and firefighting vehicles to various areas on the aerodrome, and, in particular, to the approach areas. Service roads to navigation aids should be planned in such a manner as to present minimal interference to the function of the aids. If it is necessary for a service road to cross an approach area, the road should be located so that vehicles travelling on it are not obstacles to aircraft operations.

(3) The service roads at air side system should be designed to account for local security measures. Access points to the system should, thus, need to be restricted. Should ground vehicle movements affect surface movement of aircraft on runways and taxiways, it should be required that the ground vehicle movements be coordinated by the appropriate aerodrome control. Control is normally exercised by means of two-way radio communication although visual signals, such as signal lamps, are adequate when traffic at the aerodrome is light. Signs or signals may also be employed to aid control at intersections.

(4) At intersections with runways consideration should be given to providing runway guard lights or road-holding position lights as part of the aerodrome's runway incursion

prevention programme. Runway guard lights should conform to the specifications provided in CS ADR-DSN.M.745.

(5) Roads should be designed and constructed to prevent FOD transfer to the runway and taxiways.

(6) Roads within 90 m of a runway centre line generally should be surfaced to prevent surface erosion, and the transfer of debris to the runway and taxiways.

(7) To facilitate the control and maintenance of the fencing, a perimeter service road should be constructed inside the aerodrome fencing.

(8) Perimeter service road is also used by security patrols.

(9) Where a fence is provided, the need for convenient access to outside areas should be taken into account. These access points should be of a suitable size to accommodate the passage of the largest RFFS vehicle in the aerodrome's fleet.

(10) When greater security is thought necessary, a cleared area should be provided on both sides of the fence or barrier to facilitate the work of patrols, and to make trespassing more difficult.

(11) Special measures should be required to prevent the access of an unauthorised person to runways or taxiways which overpass public roads.

(c) Emergency access roads should be considered on an aerodrome so as to facilitate achieving minimum response times for RFF vehicles.

(d) Emergency access roads should be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention should be given to the provision of ready access to approach areas up to 1 000 m from the threshold, or at least within the aerodrome boundary.

(e) Emergency access roads are not intended for use for the functions of aerodrome service roads. Therefore, it is possible to provide different access control which should be clearly visible for all service ground traffic. Road-holding position markings, lights, or runway guard lights are not necessary if the access to an emergency access road is ensured for RFF only.

(f) Aerodrome service roads may serve as emergency access roads when they are suitably located

and constructed.

(g) Emergency access roads should be capable of supporting the heaviest vehicles which should use them, and be usable in all weather conditions. Roads within 90 m of a runway centre line should be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance should be provided from overhead obstructions for the largest vehicles.

(h) When the surface of the road is indistinguishable from the surrounding area, or in areas where sand may obscure the location of the roads, edge markers should be placed at intervals of about 10 m.

CS ADR-DSN.T.905 Fire stations

(a) All rescue and firefighting vehicles should normally be housed in a fire station. Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.

(b) The fire station should be located so that the access for rescue and firefighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

(c) The fire station, and any satellite fire stations, should be located outside taxiway and runway strips, and not infringe obstacle limitation surfaces.

(d) The design of the Fire station should commensurate to the type of aircraft and other operational activities at the aerodrome.

GM1 ADR-DSN.T.905 Fire stations

GENERAL

(a) In the past there has been a tendency to provide only the minimum level of accommodation for the RFF vehicles, little more than garage space, with equally sparse facilities for their crews.

(b) Experience has shown that these standards of provision are not conducive to operational efficiency in terms of either the vehicles or the personnel who are to operate them. A study of the operational requirement has emphasized the importance of correctly sited fire stations, supported by efficient communications systems, as a prerequisite for the immediate and effective response by RFF services.

(c) Properly constructed and appointed fire stations can make an important contribution to the morale and efficiency of these services. Further, response times are likely to be reduced by undertaking in

the planning stage a study of traffic patterns, procedures, previous accident experience and the probable response paths of RFF vehicles.

GM2 ADR-DSN.T.905 Fire stations

LOCATION

(a) The location of the airport fire station is a primary factor in ensuring that recommended response times can be achieved; that is, two minutes to the end of each runway and three minutes to movement area in optimum conditions of visibility and surface conditions. Other considerations, such as the need to deal with structural fires or to undertake other duties, are of secondary importance and must be subordinated to the primary requirement.

(b) At some airports it may be necessary to consider the provision of more than one fire station, each located strategically in relation to the runway pattern. Aircraft accident studies have shown that a large proportion of accidents and incidents occur on, or close to the runway/accidents in or beyond runway end safety area locations often produce the more serious consequences in terms of fire situations and casualties.

(c) Where more than one fire station is provided, each may contain one or more vehicles from the total fleet. This divides the overall quantity of extinguishing agents available into units capable of initiating immediate fire suppression activities on arrival at the accident site. It is usual, with more than one fire station, to designate one as the master (or main) station, providing the master watchroom, and the other stations as satellites.

(d) RFF vehicles should have direct and safe access to the movement area that caters to the size of the fire vehicle(s) being deployed and be capable of reaching the extremities of this area within the recommended response time. When a new station is to be provided, vehicle response trials should be run to determine the optimum location in relation to potential accident sites. Due consideration should be given to the future development plans of the airport as these may increase the distances over which responses must be made.

(e) All fire stations should be located so that access to the runway area is direct, requiring the RFF vehicles to negotiate the minimum number of turns. Additionally, the location should ensure that the vehicle running distances are as short as possible in relation to the runway(s) the fire station is intended primarily to serve. The ability to reach standby positions without delay is important. The placement of the watchroom, if provided, in each fire station should ensure the widest possible

view of the movement area including aircraft approaches and departures. The installation of closed-circuit television (CCTV) cameras may be considered in watchrooms to enhance their view.

GM3 ADR-DSN.T.905 Fire stations

DESIGN AND CONSTRUCTION

(a) Each airport fire station should be a self-contained RFF service, with appropriate facilities for the garaging of vehicles, accommodation of crew members and the provision of operational services that are necessary to ensure their continuous ability for effective and immediate response in an emergency. Facilities for the major maintenance of fire vehicles need not be included provided that these exist elsewhere, on, or in close proximity to, the airport. The range and extent of facilities may vary between those necessary in the main fire station and those appropriate to a satellite station, but in general should include:

(1) adequate accommodation for the garaging of fire vehicles, which may include other specialist vehicles such as aerial vehicles or water rescue craft and for the conduct of in-service (minor) maintenance;

(2) domestic and administrative facilities for the personnel required to operate these fire vehicles;

(3) communications and alarm systems which will ensure the immediate and effective deployment of fire vehicles in any emergency; and

(4) appropriate storage and technical support facilities as are necessary to protect and maintain the equipment and reserves of extinguishing agents held at each fire station or nearby facility.

(b) In meeting these basic requirements, it is desirable to consider not only design features, but also constructional details since experience has shown that inadequacies in either respect can add to the time taken to receive a call and respond to an emergency, as well as introducing problems in the day-to-day use of a fire station. Some features, which are considered to be important in ensuring the functional efficiency of fire stations.

GM4 ADR-DSN.T.904 Fire stations

VEHICLE HOUSING

(a) This is usually provided in a series of bays, providing sufficient space for each vehicle and a surrounding area in which personnel can work conveniently.

(b) A minimum clearance of 1.2 m should be provided around each fire vehicle. The minimum clearance area should consider and allow for the way in which fire vehicle cabin doors and locker doors open as well as rear-mounted fire vehicle engine cowlings that may open outwards for engine access.

(c) The dimensions of each bay, including the working area, should have regard not only to the vehicles currently in service, but also to future models which may be acquired to meet increases in the airport RFF service category.

(d) The floors of the fire vehicle bays must provide for any increase in fire vehicle weights, lengths and or widths which new equipment may impose. The surface finish of floors should be resistant to oil, grease, foam concentrates, etc. and be easily cleaned. This can be achieved by having a non-slip tiled surface or a hard-top sealed concrete finish. The floors should slope down towards the doors, where a transverse drain, with heavy gauge cover, can receive surface water from the bays and the forecourt.

(e) Bay doors must be of the quick action type and of robust design, incorporating, where possible, windows to improve the natural lighting within the bays. Bay doors may be manually operated or equipped with automatic opening devices, which may include remote operation from the watchroom or in association with the operation of the station alarm bells or alerts. Provision should be made for manual operation in the event of the malfunctioning of any automatic device. The size of the door opening must allow adequate clearance for the vehicles.

GM5 ADR-DSN.T.905 Fire stations

FORECOURT

(a) The forecourt should be of sufficient size to permit fire vehicles to manoeuvre and should be provided with floodlighting for night-time activities.

(b) A slope to the bay entrance drain may accommodate fire vehicle cleaning and other surface water.

(c) Within the bays there must be adequate lighting and, in appropriate cases, heating, to maintain a temperature of at least 13°C.

(d) Where high ambient temperatures are prevalent some form of climate control should be considered.

(e) Electrical systems of appropriate design will also be required where fire vehicles are fitted with engine heaters, battery charging devices or other protective equipment.

(f) In enclosed vehicle bays, installations must be provided to convey exhaust fumes from each vehicle to the external atmosphere, thus avoiding contamination within the vehicle bays during periodic engine runs or rapid deployment of fire vehicles from the bays.

(g) All connections of services to fire vehicles must be designed to achieve immediate and safe disconnections without delaying the response of fire vehicles to an emergency.

GM6 ADR-DSN.T.905 Fire station

DOMESTIC AND ADMINISTRATIVE REQUIREMENTS

(a) Domestic facilities should include accommodation for personnel, consisting of a locker room, mess room, washroom, drying room, with consideration to administrative rooms (offices), training facilities, and fitness facilities.

(b) Locker room should provide sufficient space for the personnel to change and store their clothing as well as other personal items. Seating should also be provided.

(c) Mess room should be fitted with chairs and tables and provide facilities for the preparation of meals and food storage. Power to any cooking facilities including gas supplies should be automatically turned off on activation of the alerting systems.

(d) Drying room should be provided to allow personnel to dry wet clothing quickly.

(e) The extent of administrative accommodation will depend on the range of technical control and administration duties to be performed in a particular fire station.

(f) Class room should provide tables (desks) and chairs, a magnetic whiteboard (or blackboard), as well as appropriate library facilities relevant to the functionality.

(g) Consideration may be given to electronic resources such as data viewers, screens and computers.

(h) Facilities for fitness equipment must be provided and the area should be well ventilated. Consideration should be given to providing fitness equipment conducive to the development and maintenance of anaerobic and aerobic fitness.

Note. — Local building codes and occupational health and safety legislation, or similar, may take precedence.

GM7 ADR-DSN.T.905 Fire stations

OTHER SUPPORTING REQUIREMENTS

(a) These are facilities which can contribute to the efficiency of RFF services by preserving equipment and extinguishing media, ensuring its prompt availability and in providing test, inspection, maintenance and training opportunities.

(b) Storage space will be required for fire hoses, with suitable racking and ventilation and may include hose repair equipment and the hose record board.

(c) Drying facilities for fire hose will be required in certain climates and may be in the form of a drying tower or rack or an enclosed heating installation.

(d) Storage for extinguishing media, such as foam concentrate and complementary agents, and particular attention must be given to ensuring that temperatures are kept within the levels specified for each agent. Suitable facilities for containment should also be provided for stored foam concentrates in the event of spillage or leakage. Advice in respect of appropriate storage temperatures can be obtained from suppliers.

(e) A general workshop, where maintenance and repairs can be performed, will make a valuable contribution towards the efficient and economical operation of the service.

(f) A fire hydrant system must be provided that is capable of delivering water at an appropriate rate to minimize replenishment times.

(g) Appropriate facilities for the testing of fire hose and vehicles, for the rapid replenishment of vehicles after use and for training purposes should be readily available.

(h) Pumping facilities for transferring foam concentrates from containers to fire vehicles expeditiously is also desirable.

(i) Facilities for the expeditious replenishment of complementary agents for fire vehicles should be available.

GM 8 ADR-DSN.T.905 Fire stations

WATCHROOMS

(a) In all fire stations, watchroom should be provided as a central point for the reception of emergency calls, from which fire vehicles may be dispatched for responses of all kinds and resources can be mobilized and directed.

(b) A watchroom should be sited in a position which overlooks as much of the movement area as possible. It may be necessary to elevate the watchroom to provide the maximum degree of surveillance.

(c) Special provisions may be necessary to soundproof the watchroom and to deal with the consequent ventilation and climate control problems which soundproofing may create.

(d) Tinted windows or sunshades may be required in some locations to minimize the effects of direct or indirect exposure to the sun and other external elements such as concrete surfaces and climatic conditions.

(e) Provision will be necessary to vary the intensity of watchroom lighting to permit external vision when the watchroom is in use at night.

(f) The communications facilities and equipment required in watchrooms should commensurate with the types of aircraft operations and aerodrome activities

(g) Where there is more than 1 watchroom at an airport, a distinction must be made between the requirements for the master watchroom and watchrooms in satellite fire stations.

GM 9 ADR-DSN.T.905 Fire stations

OTHER GENERAL ASPECTS

(a) In addition to the particular requirements considered above there are a number of general items, applicable to all fire stations, which can contribute to their efficient operation and the well-being of personnel.

(b) Where it may be necessary to elevate a watchroom for operational reasons, it is desirable to provide all accommodation on one level. It is important, in preparing the original plan, to make some provision for expansion to correspond with the growth of the airport.

(c) If the plan meets this situation by providing the domestic accommodation to one side of the vehicle bays, an additional benefit will be the exclusion of exhaust fumes from this accommodation when the vehicles are running.

(d) Fire vehicle bays with access from the rear will aid the movement of fire vehicles by providing a drive-through facility.

(e) The parking of fire vehicles should be such that the failure of any one should not prevent others from making an immediate response.

(f) The high noise levels to which some fire stations may be exposed may require some measure of soundproofing in the domestic accommodation in addition to the watchroom.

(g) Additional attention to ventilation and climate control is necessary in ensuring the comfort and efficiency of the occupants.

(h) All fire stations should be connected to a secondary (standby) electrical power supply to ensure the continuous availability of essential equipment.

CS ADR-DSN.T.910 Equipment frangibility requirements

Equipment and structures shall be so designed to meet the appropriate frangibility characteristics, when required.

GM1 ADR-DSN.T.910 Equipment frangibility requirements

(a) Equipment and supports required to be frangible should be designed and constructed so that they should break, distort, or yield in the event that they are accidentally impacted by an aircraft. The design materials selected should preclude any tendency for the components, including the electrical conductors, etc., to 'wrap around' the colliding aircraft or any part of it.

(b) Frangible structures should be designed to withstand the static and operational wind or jet blast loads with a suitable factor of safety but should break, distort, or yield readily when subjected to the sudden collision forces of a 3 000 kg aircraft airborne and travelling at 140 km/h (75 kt), or moving on the ground at 50 km/h (27 kt).

(c) Guidance on design for frangibility is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 6, Frangibility.

CS ADR-DSN.T.915 Siting of equipment and installations on operational areas

(a) Equipment and installations shall be sited as far away from the runway and taxiway centre lines as practicable.

(b) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation endangering an aircraft shall be located on a runway strip, a runway end safety area, a taxiway strip, or within the following distances as per the table below or if it would endanger an aircraft, or on a clearway if it would endanger an aircraft in the air.

Code Letter	Distance between taxiway, other than aircraft stand taxilane, centre line to object (metres)
A	15.5
B	20
C	26
D	37
E	43.5
F	51

(c) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located:

(1) on that portion of a runway strip within:

(i) 75 m of the runway centre line where the code number is 3 or 4; or

(ii) 45 m of the runway centre line where the code number is 1 or 2; or

(2) on a runway end safety area, a taxiway strip, or within the distances specified in Table CS-79; or

(3) on a clearway and which would endanger an aircraft in the air;

shall be frangible and mounted as low as possible.

(d) Unless its function requires it to be there for air navigation or for aircraft safety purposes, or if after a safety assessment, it is determined that it would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes, no equipment or installation shall be located within 240 m from the end of the strip and within:

(1) 60 m of the extended centre line where the code number is 3 or 4; or

(2) 45 m of the extended centre line where the code number is 1 or 2; of

a precision approach runway Category I, II or III.

(e) Any equipment or installation required for air navigation or for aircraft safety purposes, which should be located on or near a strip of a precision approach runway Category I, II, or III and which:

(1) is situated within 240 m from the end of the strip and within:

(i) 60 m of the extended runway centre line where the code number is 3 or 4; or

(ii) 45 m of the extended runway centre line where the code number is 1 or 2; or

(2) penetrates the inner approach surface, the inner transitional surface, or the balked landing surface;

shall be frangible and mounted as low as possible.

(f) Any equipment or installation required for air navigation or for aircraft safety purposes that is an obstacle of operational significance in accordance with CS ADR-DSN.J.470(d), CS ADR-DSN.J.475(e), CS ADR-DSN.J.480(g), or CS ADR-DSN.J.485(e) should be frangible and mounted as low as possible.

(g) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on the non-graded portion of a runway strip shall be regarded as an obstacle and should be frangible and mounted as low as possible.

Any equipment or installation required for air navigation purposes or for aircraft safety purposes which is an obstacle penetrating the conical, inner horizontal, approach slope, shall be frangible and mounted as low as possible.

GM1 ADR-DSN.T.915 Siting of equipment and installations on operational areas

(a) The design of light fixtures and their supporting structures, light units of visual approach slope indicators, signs and markers is specified in CS ADR-DSN.M.615, CS ADR-DSN.M.640, CS ADR-DSN.N.775, and the certification specifications of Chapter P respectively.

(b) Guidance on siting of equipment and installations on operational areas is given in ICAO Doc 9157, Aerodrome Design Manuals, Part 2, Taxiways, Aprons and Holding Bays and Part 6, Frangibility.

(c) Guidance on the frangible design of visual and non-visual aids for navigation is given in the ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.

(d) Requirements for obstacle limitation surfaces are specified in the certification specifications of Chapter J.

(e) The term ‘aircraft safety purposes’ refers to the installation of arresting systems.

CS ADR-DSN.T.916 Security lighting

(a) At an aerodrome where it is deemed desirable for security reasons, a fence or other barrier provided for the protection of international civil aviation and its facilities shall be illuminated at a minimum essential level.

(b) Consideration shall be given to locating lights so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

GM1 ADR-DSN.T.916 Security lighting

Fence or other barrier provided Should:

(a) take into account any runways or taxiways which pass over public roads, and determination of studies when greater security is thought necessary.

(b) evaluate risk assessment conducted to determine portions of the fence to be lit.

CS ADR-DSN.T.920 Fencing

(a) The safety objective of fencing is to prevent animals or unauthorised persons that could be a safety risk to aircraft operations, to enter the aerodrome.

(b) Fencing shall be sited as far away from the runway and taxiway centre lines as practicable.

(c) Suitable means of protection such as fence or other suitable barrier shall be provided on an aerodrome to prevent the entrance to the aerodrome:

(1) by non-flying animals large enough to be a hazard to aircraft; and/or

(2) by an unauthorised person.

(3) This includes the barring of sewers, ducts, tunnels, etc. where necessary to prevent access.

(d) Suitable means of protection shall be provided to deter the inadvertent or premeditated access of unauthorised persons into ground installations and facilities essential for the safety of civil aviation located off the aerodrome. This is intended to include the barring of sewers, ducts, tunnels, etc., where necessary to prevent access.

(e) The fence or barrier shall be located so as to separate the movement area and other facilities or zones on the aerodrome vital to the safe operation of aircraft from areas open to public access.

(f) When greater security is thought necessary, a cleared area shall be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult.

Consideration should be given to the provision of a perimeter road inside the aerodrome fencing for the use of both maintenance personnel and security patrols.

(g) Aerodrome operator shall assess and provide special measures that are required to prevent the access of an unauthorized person to runways or taxiways which overpass public roads and bridges.

GM1 ADR.OPS.DSN.T.920 Fencing

(a) should be given to the provision of a perimeter road inside the aerodrome fencing for the use of both maintenance personnel and security patrols.

(b) Special measures may be required to prevent the access of an unauthorised persons to runways or taxiways which overpass public roads.

(c) Fencing can vary in design, height, and type depending on local needs. Generally, it is recommended that the fencing be galvanized steel, chain link fabric installed to a height of 2,5 m, and topped with a three-strand barbed wire overhang. The latter should have a minimum 15 cm separation between strands and extend outward at 45-degree angle from the horizontal. Fence posts should be installed at no greater than 3 m intervals and be located within 5 cm of any wall or structure forming part of the perimeter. Gates should be constructed with material of comparable strength and durability, and open to an angle of at least 90 degrees. Hinges should be such as to preclude unauthorised removal.

(d) Top and bottom selvages of the fence having a twisted and barbed finish. The bottom of the fence installed to within 5 cm of hard surfacing or stabilised soil. However, in areas where unstable soil conditions are prevalent, the fabric installed to extend at least 5 cm below the surface or imbedded in concrete curbing. All fencing should be grounded. Care should be taken that metallic fencing is not installed when it should interface with the operation of navigation aids. The fence itself should allow clear visibility and easy maintenance.

(e) The number of gates should be limited to the minimum required for the safe and efficient operation of the facility. Access points should need to be made in the fence to allow the passage of authorised vehicles and persons. While the number of access points should be kept to a minimum, adequate access points should be planned for routine operations, maintenance and emergency operations.

CS ADR-DSN.T.921 Autonomous runway incursion warning system (ARIWS)

(a) Applicability: The inclusion of detailed specifications for an ARIWS is not intended to imply that an ARIWS has to be provided at an aerodrome.

(b) Characteristics: Where an ARIWS is installed at an aerodrome:

(1) It shall provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle operator;

(2) It shall function and be controlled independently of any other visual system on the aerodrome;

(3) Its visual aid components, i.e. lights, shall be designed to conform with the relevant specifications in Chapter M; and

(4) Failure of the ARIWS or part of it should not interfere with normal aerodrome operations. To this end, provision should be made to allow air traffic services (ATS) unit to partially or entirely shut down the system.

(c) Where an ARIWS is installed at an aerodrome, information on its characteristics and status should be provided to the appropriate aeronautical information services (AIS) for promulgation in the aeronautical information publication (AIP) with the description of the aerodrome surface movement guidance and control system and markings.

GM1 ADR-DSN.T.921 Autonomous runway incursion warning system (ARIWS)

(a) The implementation of autonomous systems is generally quite complex in design and operation and, as such, deserves careful consideration by all involved parties such as aerodrome operators, air traffic services (ATS) and aircraft operators. This guidance provides a clearer description of the system(s) and offer some suggested actions required in order to properly implement this system(s) at an aerodrome.

(b) An ARIWS may be installed in conjunction with enhanced taxiway centre line markings, stop bars or runway guard lights.

(c) The system(s) should be operational under all weather conditions, including low visibility.

(d) An ARIWS may share common sensory components of a surface movement guidance and control system (SMGCS) or advanced surface movement guidance and control system (A-SMGCS), however, it operates independently of either system.

(e) General description:

(1) The operation of an ARIWS is based upon a surveillance system which monitors the actual situation on a runway and automatically returns this information to warning lights at the runway (take-off) thresholds and entrances. When an aircraft departs from a runway (rolling) or arrives at a runway (short final), red warning lights at the entrances will illuminate, indicating that it is unsafe to enter or cross the runway. When an aircraft is aligned on the runway for take-off and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate at the threshold area, indicating that it is unsafe to start the take-off roll.

(2) In general, an ARIWS consists of an independent surveillance system (primary radar, multilateration, specialised cameras, dedicated radar, etc.) and a warning system in the form of extra airfield lighting systems connected through a processor that generates alerts independent from the air traffic control (ATC) directly to the flight crews and vehicle operators.

(3) An ARIWS does not require circuit interleaving, secondary power supply or operational connection to other visual aid systems.

(4) In practice, not every entrance or threshold needs to be equipped with warning lights. Each aerodrome will have to assess its needs individually, depending on the characteristics of the aerodrome. There are several systems developed offering the same or similar functionality.

(f) Flight crew actions:

(1) It is of critical importance that flight crews understand the warning being transmitted by the ARIWS system. Warnings are provided in near real-time directly to the flight crew because there is no time for 'relay' types of communications. In other words, a conflict warning generated to ATS which must then interpret the warning, evaluate the situation and communicate to the aircraft in question, would result in several seconds being taken up where each second is critical in the ability to stop the aircraft safely and prevent a potential collision. Pilots are presented with a globally consistent signal which means 'STOP IMMEDIATELY' and should be taught to react accordingly. Likewise, pilots receiving an ATS clearance to take-off or cross a runway, and seeing the red-light array, should

STOP and advise ATS that they aborted/stopped because of the red lights. Again, the criticality of the timeline involved is so tight that there is no room for misinterpretation of the signal. It is of utmost importance that the visual signal be consistent around the world.

(2) It also has to be stressed that the extinguishing of the red lights does not, in itself, indicate a clearance to proceed. That clearance is still required from ATC. The absence of red warning lights only means that potential conflicts have not been detected.

(3) In the event that a system becomes unserviceable, one of two things will occur. If the system fails in the extinguished condition, then no procedural changes need to be accomplished. The only thing that will happen is the loss of the automatic, independent warning system. Both ATS operations and flight crew procedures (in response to ATS clearances) will remain unchanged.

(4) Procedures should be developed to address the circumstance where the system fails in the illuminated condition. It will be up to the ATS and/or aerodrome operator to establish those procedures depending on their own circumstances. It must be remembered that flight crews are instructed to 'STOP' at all red lights. If the affected portion of the system, or the entire system, is shut off the situation is reverted to the extinguished scenario described in the previous paragraph.

(g) Aerodromes:

(1) An ARIWS does not have to be provided at all aerodromes. An aerodrome considering the installation of such a system may wish to assess its needs individually, depending on traffic levels, aerodrome geometry, ground taxi patterns, etc. Local user groups such as the local runway safety team (LRST) may be of assistance in this process. Also, not every runway or taxiway needs to be equipped with the lighting array(s), and not every installation requires a comprehensive ground surveillance system to feed information to the conflict detection computer.

(2) Although there may be local specific requirements, some basic system requirements are applicable to all ARIWS:

(i) the control system and energy power supply of the system should be independent from any other system in use at the aerodrome, especially the other parts of the lighting system;

(ii) the system should operate independently from ATS communications;

(iii) the system should provide a globally accepted visual signal that is consistent and instantly understood by crews; and

(iv) local procedures should be developed in the case of malfunction or failure of a portion of or the entire system.

(h) Air traffic services:

(1) The ARIWS is designed to be complementary to normal ATS functions, providing warnings to flight crews and vehicle operators when some conflict has been unintentionally created or missed during normal aerodrome operations. The ARIWS will provide a direct warning when, for example, ground control or tower (local) control has provided a clearance to hold short of a runway but the flight crew or vehicle operator has 'missed' the hold short portion of their clearance and the tower has issued a take-off or landing clearance to that same runway, and the 'non-read back' by the flight crew or vehicle operator was missed by ATC.

(2) In the case where a clearance has been issued and a crew reports a non-compliance due to 'red lights', or aborts because of 'red lights', then it is imperative that the controller assess the situation and provide additional instructions, as necessary. It may well be that the system has generated a false warning or that the potential incursion no longer exists; however, it may also be a valid warning. In any case, additional instructions and/or a new clearance need to be provided. In the case where the system has failed, then procedures will need to be put into place, as described in paragraphs (f)(3) and (f)(4) above. In no case should the illumination of the ARIWS be dismissed without confirmation that, in fact, there is no conflict. It is worth noting that there have been numerous incidents avoided at aerodromes with such systems installed. It is also worth noting that there have been false warnings as well, usually as a result of the calibration of the warning software, but in any case, the potential conflict existence or non-existence should be confirmed.

(3) While many installations may have a visual or audio warning available to ATS personnel, it is in no way intended that ATS personnel be required to actively monitor the system. Such warnings may assist ATS personnel in quickly assessing the conflict in the event of a warning and help them to provide appropriate further instructions, but the ARIWS should not play

an active part in the normal functioning of any ATS facility.

(4) Each aerodrome where the system is installed should develop procedures depending upon its unique situation. Again, it has to be stressed that under no circumstances should pilots or operators be instructed to 'cross the red lights'. As indicated above, the use of local runway safety teams may greatly assist in the development of this process.

(i) Promulgation of information:

(1) Specifications on providing information in the aeronautical information publication (AIP) are given in ICAO Annex 15, Aeronautical Information Services. Information on the characteristics and status of an ARIWS at an aerodrome is promulgated in the AIP Section AD 2.9, and its status updated as necessary through notice to airmen (NOTAM) or automatic terminal information service (ATIS). Detailed specifications concerning the AIP are contained in PANS-AIM (Doc 10066).

(2) Aircraft operators are to ensure that flight crews' documentation include procedures regarding ARIWS and appropriate guidance in compliance with ICAO Annex 6, Operation of Aircraft, Part I.

(3) Aerodromes may provide additional sources of guidance on operations and procedures for their personnel, aircraft operators, ATS and third-party personnel that may have to deal with an ARIWS.

CHAPTER U — COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

CS ADR-DSN.U.925 General

(a) The specifications in this Chapter define the chromaticity limits of colours to be used for aeronautical ground lights, markings, signs, and panels. The specifications are in accord with the specifications in the International Commission on Illumination (CIE), except for the colour orange in Figure U-2.

(b) The chromaticity is expressed in terms of the standard observer and coordinate system adopted by the International Commission on Illumination (CIE).

(c) The chromaticity for solid state lighting (e.g. LEDs) is based upon the boundaries given in Standard S 004/E-2001 of the International Commission on Illumination (CIE), except for the blue boundary of white.

GM1 ADR-DSN.U.925 General

For reasonably certain recognition, it is important that the eye illumination be well above the threshold of perception, that the colour not be greatly modified by selective atmospheric attenuations and that the observer's colour vision be adequate. There is also a risk of confusion of colour at an extremely high level of eye illumination such as may be obtained from a high-intensity source at very close range. Experience indicates that satisfactory recognition can be achieved if due attention is given to these factors.

CS ADR-DSN.U.930 Colour for aeronautical ground lights

(a) The chromaticity of aeronautical ground lights with filament-type light sources shall be within the following boundaries:

CIE Equations (see Figure U-1A):

(1)	Red	
	Purple boundary	y = 0.980 – x
	Yellow boundary	y = 0.335 except for visual approach slope
	Yellow boundary	y = 0.320 for visual approach slope

	Note: see CS ADR-DSN.M.645(c)(2)(i)	
(2)	Yellow	
	Red boundary	y = 0.382
	White boundary	y = 0.790 – 0.667x
	Green boundary	y = x – 0.120
(3)	Green	
	Yellow boundary	x = 0.360 – 0.080y
	White boundary	x = 0.650y
	Blue boundary	y = 0.390 – 0.171x
(4)	Blue	
	Green boundary	y = 0.805x + 0.065
	White boundary	y = 0.400 – x
	Purple boundary	x = 0.600y + 0.133
(5)	White	
	Yellow boundary	x = 0.500
	Blue boundary	x = 0.285
	Green boundary	y = 0.440 and y = 0.150 + 0.640x
	Purple boundary	y = 0.050 + 0.750x and y = 0.382
(6)	Variable white	
	Yellow boundary	x = 0.255 + 0.750y and y = 0.790 – 0.667x
	Blue boundary	x = 0.285
	Green boundary	y = 0.440 and y = 0.150 + 0.640x
	Purple boundary	y = 0.050 + 0.750x and y = 0.382

(b) Where increased certainty of recognition from white is more important than maximum visual range, green signals should be within the following boundaries:

(1)	Yellow boundary	y = 0.726 – 0.726x
(2)	White boundary	x = 0.625y – 0.041
(3)	Blue boundary	y = 0.390 – 0.171x

(c) Where dimming is not required, or where observers with defective colour vision must be able to determine the colour of light, the green signal should be within the following boundaries:

(1)	Yellow boundary	y = 0.726 – 0.726x

(2)	White boundary	x = 0.650y
(3)	Blue boundary	y = 0.390 – 0.171x

Where the colour signal is to be seen from long range, it has been the practice to use colours within the above boundaries.

(d) Discrimination between lights having filament-type sources:

(1) If there is a requirement to discriminate yellow and white from each other, they should be displayed in close proximity of time or space as, for example, by being flashed successively from the same beacon.

(2) If there is a requirement to discriminate yellow from green and/or white, as for example on exit taxiway centre line lights, the y coordinates of the yellow light should not exceed a value of 0.40. The limits of white have been based on the assumption that they should be used in situations in which the characteristics (colour temperature) of the light source will be substantially constant.

(3) The colour variable white is intended to be used only for lights that are to be varied in intensity, e.g. to avoid dazzling. If this colour is to be discriminated from yellow, the lights should be so designed and operated that:

(i) the x coordinate of the yellow is at least 0.050 greater than the x coordinate of the white; and

(ii) the disposition of the lights will be such that the yellow lights are displayed simultaneously and in close proximity to the white lights.

(e) The chromaticity of aeronautical ground lights with solid state light sources, e.g. LEDs, shall be within the following boundaries:

CIE Equations (see Figure U-1B):

1	Red	
	Purple boundary	y= 0.980 - x
	Yellow boundary	y = 0.335, except for visual approach slope indicator systems;

	Yellow boundary	y = 0.320, for visual approach slope indicator systems.
	Note: see CS ADR-DSN.M.645(c)(2)(i)	
2	Yellow	
	Red boundary	y = 0.387
	White boundary	x = 0.980 – x
	Green boundary	y = 0.727x+0.054
3	Green (refer also to GM1 ADR-DSN.U.930(d) and (e))	
	Yellow boundary	x = 0.310
	White boundary	x = 0.625y – 0.041
	Blue	y = 0.400
4	Blue	
	Green boundary	y = 1.141x – 0.037
	White boundary	y = 0.400 – y
	Purple boundary	x = 0.134 + 0.590y
5	White	
	Yellow boundary	x = 0.440
	Blue boundary	x = 0.320
	Green boundary	y = 0.150 + 0.643x
	Purple boundary	y = 0.050 + 0.757x
6	Variable white	
	The boundaries of variable white for solid state light sources are those specified in CS ADR-DSN.U.930(d)(5) above.	

7	Where observers with defective colour vision must be able to determine the colour of the light, green signals should be within the following boundaries:	
	Yellow boundary	y = 0.726 – 0.726x
	White boundary	x = 0.625y – 0.041
	Blue boundary	y = 0.400
8	In order to avoid a large variation of shades of green, if colours within the boundaries below are selected, colours within the boundaries of (7) should not be used.	
	Yellow boundary	x = 0.310
	White boundary	x = 0.625y – 0.041
	Blue boundary	y = 0.726 – 0.726x

(f) Colour measurement for filament-type and solid-state light sources:

(a) The colour of aeronautical ground lights shall be verified as being within the boundaries specified in Figure U-1A or U-1B, as appropriate, by measurement at five points within the area limited by the innermost isocandela curve in the isocandela diagrams in CS ADR. DSN.U.940, with operation at rated current or voltage. In the case of elliptical or circular isocandela curves, the colour measurements shall be taken at the centre and at the horizontal and vertical limits. In the case of rectangular isocandela curves, the colour measurements shall be taken at the centre and the limits of the diagonals (corners). In addition, the colour of the light shall be checked at the outermost isocandela curve to ensure that there is no colour shift that might cause signal confusion to the pilot.

(b) Certain light units may have application so that they may be viewed and used by pilots from directions beyond that of the outermost isocandela curve (e.g. stop bar lights at significantly wide runway-holding positions). In such instances, the GCAA may assess the actual application and if necessary require a check of colour shift at angular ranges beyond the outermost curve.

(c) In the case of visual approach slope indicators and other light units having a colour transition sector, the colour shall be measured at points in accordance with paragraph CS

ADR-DSN.U.930(e)(1) above, except that the colour areas shall be treated separately and no point shall be within 0.5 degrees of the transition sector.

GM1 CS ADR-DSN.U.930 Colour for aeronautical ground lights

(a) For the outermost isocandela curve, a measurement of colour coordinates should be made and recorded for review and judgement of acceptability by the GCAA.

CS ADR-DSN.U.935 Colours for markings, sign and panels

(a) The specifications in surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs, and panels usually change with time and, therefore, require renewal.

(b) The specifications in paragraph (f) below for transilluminated (internally illuminated) panels are interim in nature and are based on the CIE specifications for transilluminated signs. It is intended that these specifications should be reviewed and updated as and when CIE develops specifications for internally illuminated panels.

(c) The chromaticity and luminance factors of ordinary colours, colours of retroreflective materials, and colours of internally illuminated signs and panels shall be determined under the following standard conditions:

(1) angle of illumination: 45°;

(2) direction of view: perpendicular to surface; and

(3) illuminant: CIE standard illuminant D65.

(d) The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels should be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure U-2):

(1)	Red	
	Purple boundary	y = 0.345 – 0.051x
	White boundary	y = 0.910 – x
	Orange boundary	y = 0.314 + 0.047x
	Luminance factor	β = 0.07 (minimum)

(2)	Orange	
	Red boundary	y = 0.285 + 0.100x
	White boundary	y = 0.940 – x
	Yellow boundary	y = 0.250 + 0.220x
	Luminance factor	β = 0.20 (minimum)
(3)	Yellow	
	Orange boundary	y = 0.108 + 0.707x
	White boundary	y = 0.910 – x
	Green boundary	y = 1.35x – 0.093
	Luminance factor	β = 0.45 (minimum)
(4)	White	
	Purple boundary	y = 0.010 + x
	Blue boundary	y = 0.610 – x
	Green boundary	y = 0.030 + x
	Yellow boundary	y = 0.710 – x
	Luminance factor	β = 0.75 (minimum)
(5)	Black	
	Purple boundary	y = x – 0.030
	Blue boundary	y = 0.570 – x
	Green boundary	y = 0.050 + x
	Yellow boundary	y = 0.740 – x
	Luminance factor	β = 0.03 (maximum)
(6)	Yellowish green	
	Green boundary	y = 1.317x + 0.4
	White boundary	y = 0.910 – x
	Yellow boundary	y = 0.867x + 0.4
(7)	Green	
	Yellow boundary	x = 0.313
	White boundary	y = 0.243 + 0.670x
	Blue boundary	y = 0.493 – 0.524x
	Luminance factor	β = 0.10 (minimum)

The small separation between surface red and surface orange is not sufficient to ensure the distinction of these colours when seen separately.

(e) The chromaticity and luminance factors of colours of retroreflective materials for markings, signs, and panels should be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure U-3):

(1)	Red	
	Purple boundary	y = 0.345 – 0.051x
	White boundary	y = 0.910 – x
	Orange boundary	y = 0.314 + 0.047x
	Luminance factor	β = 0.03 (minimum)
(2)	Orange	
	Red boundary	y = 0.265 + 0.205x
	White boundary	y = 0.910 – x
	Yellow boundary	y = 0.207 + 0.390x
	Luminance factor	β = 0.14 (minimum)
(3)	Yellow	
	Orange boundary	y = 0.160 + 0.540x
	White boundary	y = 0.910 – x
	Green boundary	y = 1.35x – 0.093
	Luminance factor	β = 0.16 (minimum)
(4)	White	
	Purple boundary	y = x
	Blue boundary	y = 0.610 – x
	Green boundary	y = 0.040 + x
	Yellow boundary	y = 0.710 – x
	Luminance factor	β = 0.27 (minimum)
	Blue	

(5)	Green boundary	y = 0.118 + 0.675x
	White boundary	y = 0.370 – x
	Purple boundary	y = 1.65x – 0.187
	Luminance factor	β = 0.01 (minimum)
(6)	Green	
	Yellow boundary	y = 0.711 – 1.22x
	White boundary	y = 0.243 + 0.670x
	Blue boundary	y = 0.405 – 0.243x
	Luminance factor	β = 0.03 (minimum)

(f) The chromaticity and luminance factors of colours for luminescent or internally illuminated signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure U-4):

(1)	Red	
	Purple boundary	y = 0.345 – 0.051x
	White boundary	y = 0.910 – x
	Orange boundary	y = 0.314 + 0.047x
	Luminance factor (day condition)	β = 0.07 (minimum)
	Relative luminance to white (night condition)	5 % (minimum) 20 % (max)
(2)	Yellow	
	Orange boundary	y = 0.108 + 0.707x
	White boundary	y = 0.910 – x
	Green boundary	y = 1.35x – 0.093
	Luminance factor (day condition)	β = 0.45 (minimum)
	Relative luminance to white (night condition)	30 % (minimum) 80 % (max)
(3)	White	
	Purple boundary	y = 0.010 + x

	Blue boundary	y = 0.610 – x
	Green boundary	y = 0.030 + x
	Yellow boundary	y = 0.710 – x
	Luminance factor (day condition)	β = 0.75 (minimum)
	Relative luminance to white (night conditions)	100 %
(4)	Black	
	Purple boundary	y = x – 0.030
	Blue boundary	y = 0.570 – x
	Green boundary	y = 0.050 + x
	Luminance factor (day condition)	β = 0.03 (max)
	Relative luminance to white (night condition)	0 % (minimum) 2 % (maximum)
(5)	Green	
	Yellow boundary	x = 0.313
	White boundary	y = 0.243 + 0.670x
	Blue boundary	y = 0.493 – 0.524x
	Luminance factor(day conditions)	β = 0.10 minimum
	Relative luminance to white (night conditions)	5 % (minimum) 30 % (maximum)

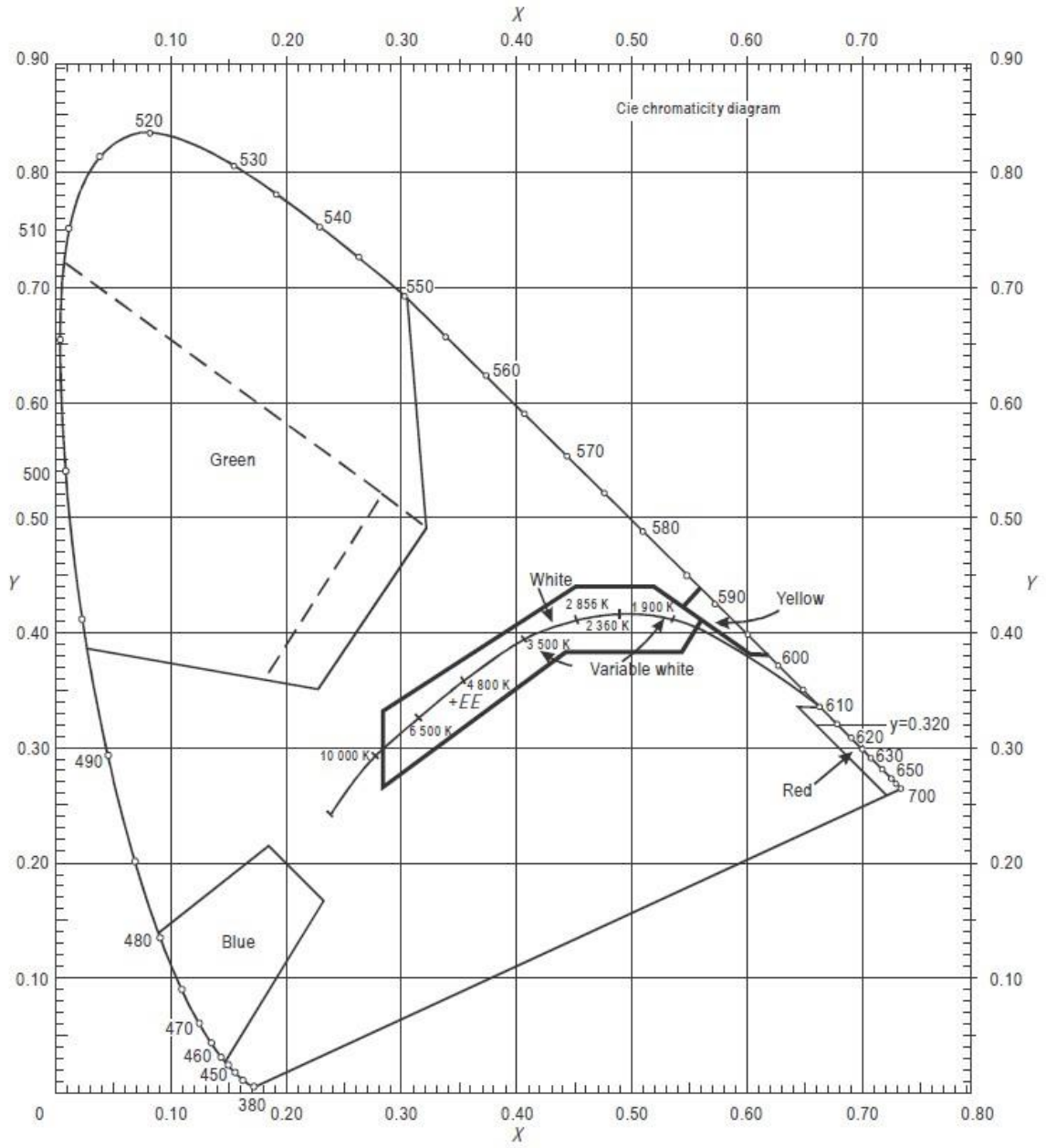


Figure U- 1A. Colours for aeronautical ground lights (filament-type lamps)

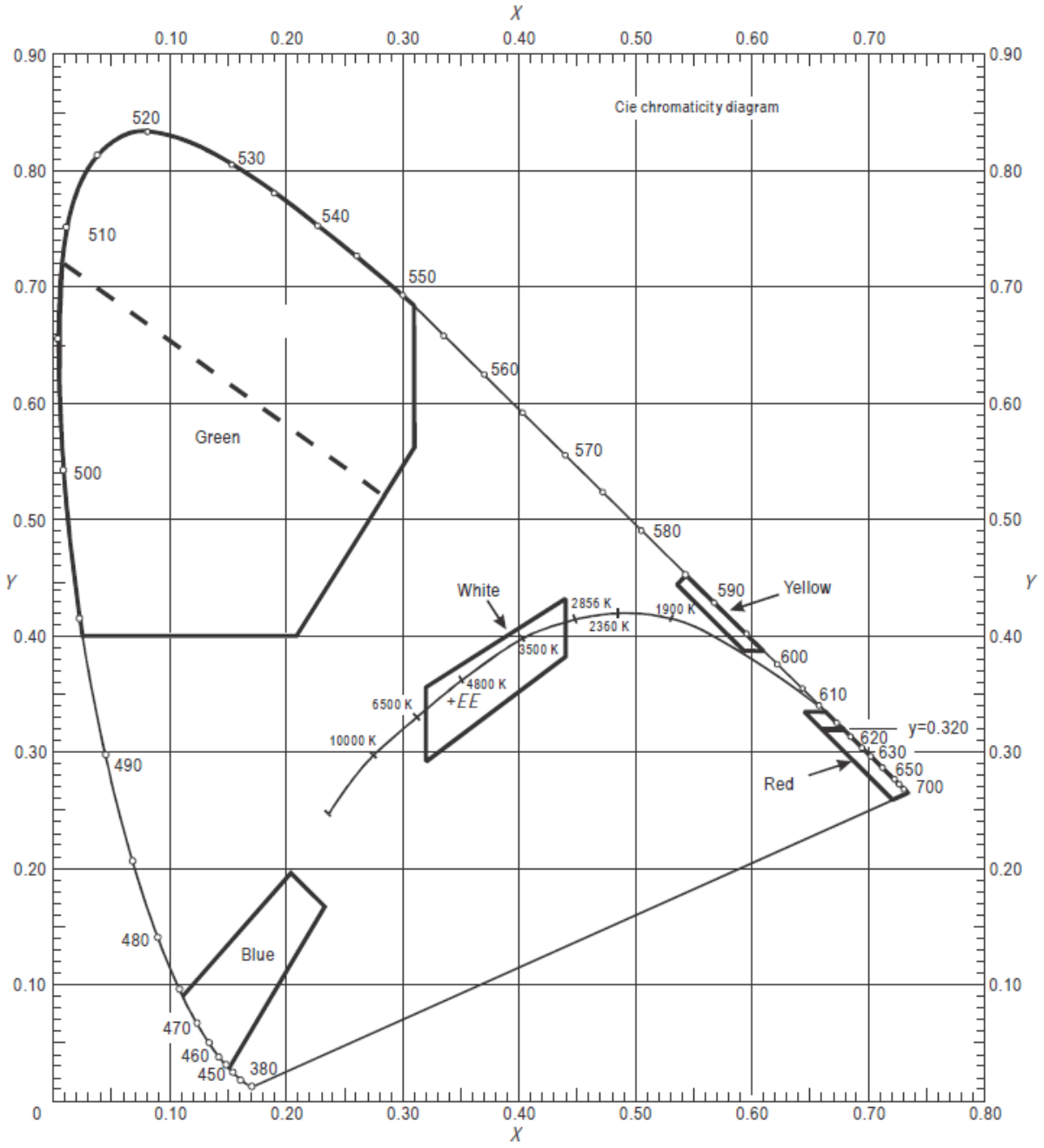


Figure U-1B. Colours for aeronautical ground lights (solid state lighting)1

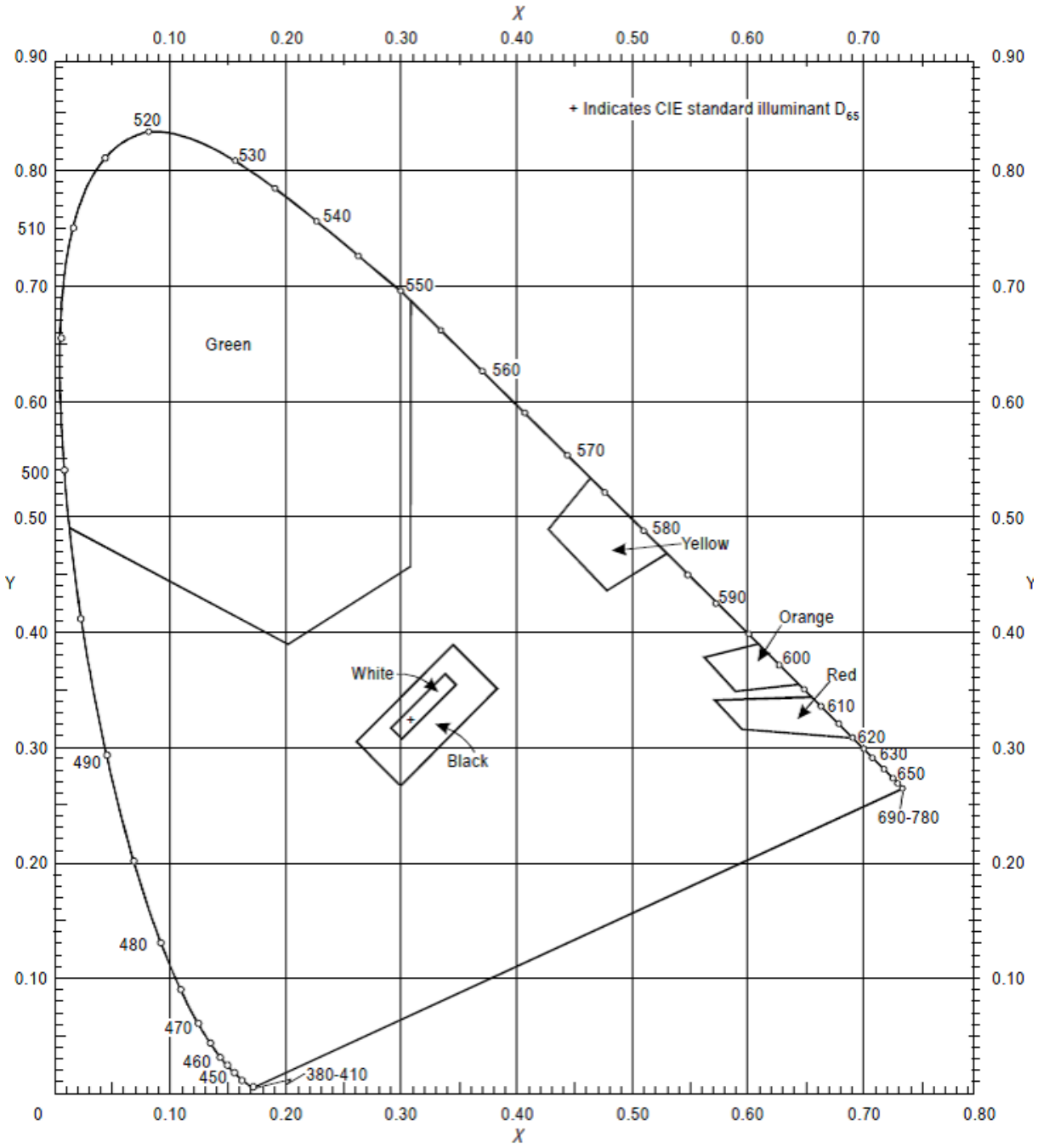


Figure U- 2. Ordinary colours for markings and externally illuminated signs and panels

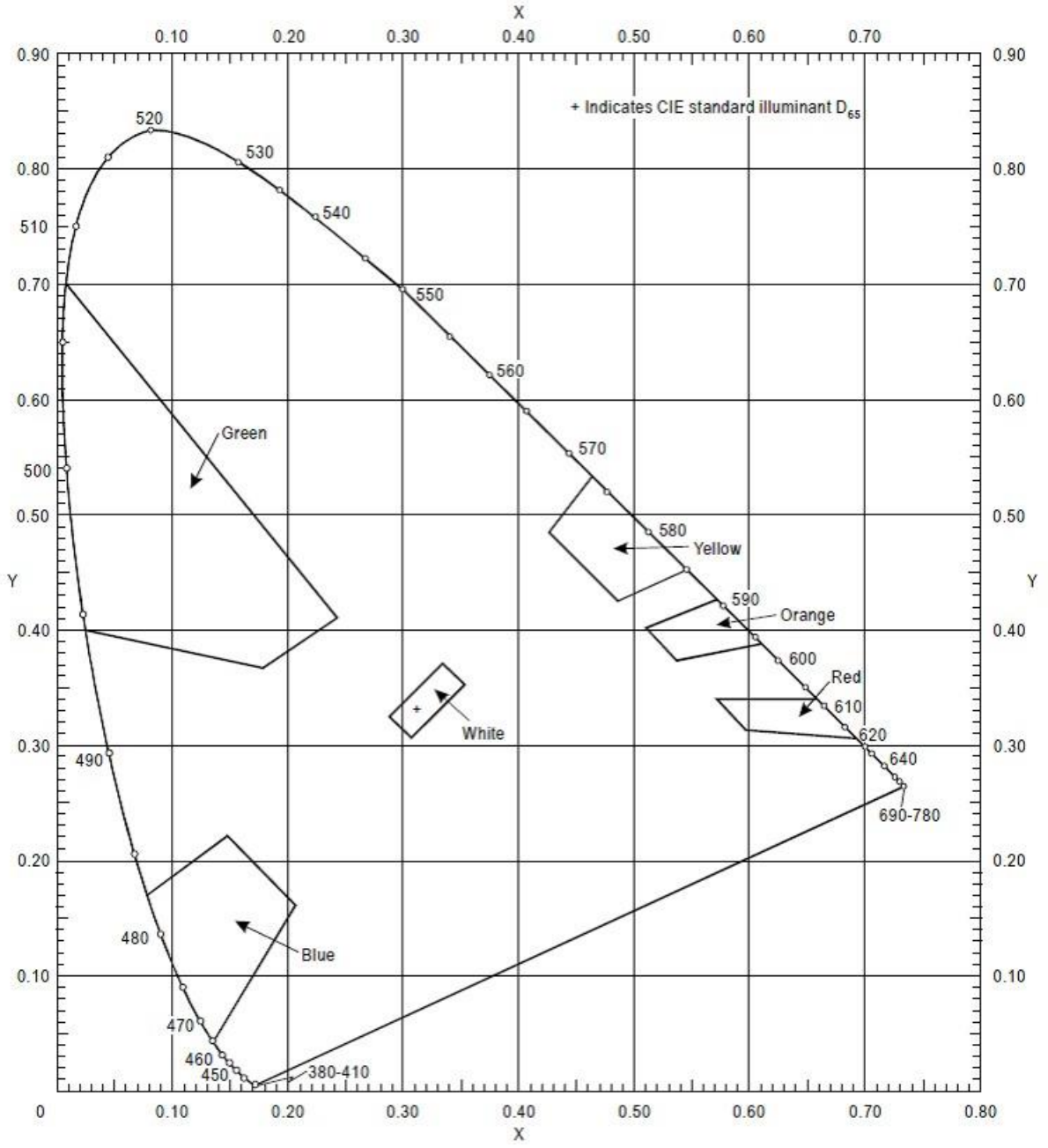


Figure U- 3. Colours of retroreflective materials for markings, signs and panels

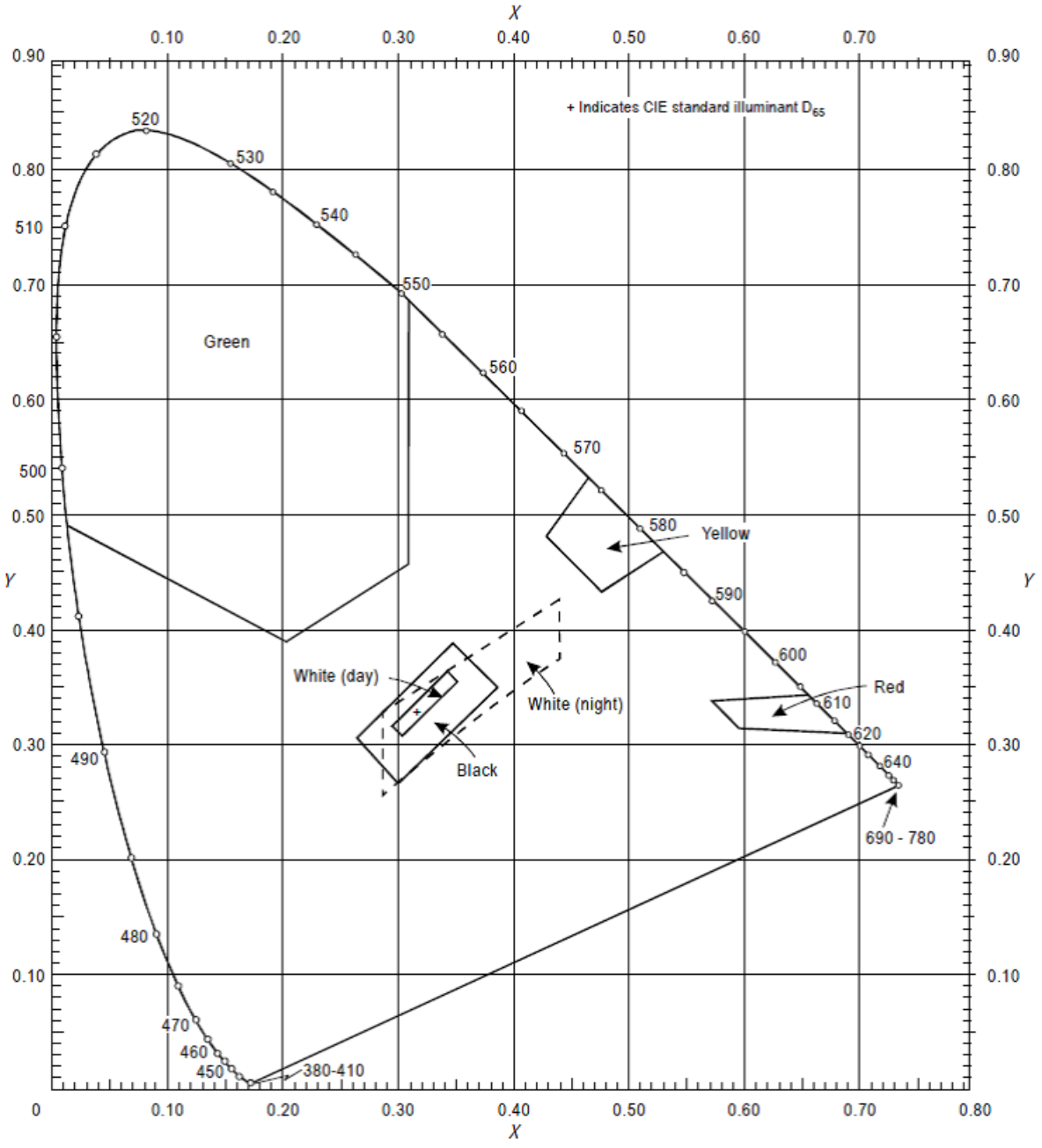


Figure U- 4. Colours of luminescent or transilluminated (internally illuminated) signs and panels

CS ADR-DSN.U.940 Aeronautical ground light characteristics

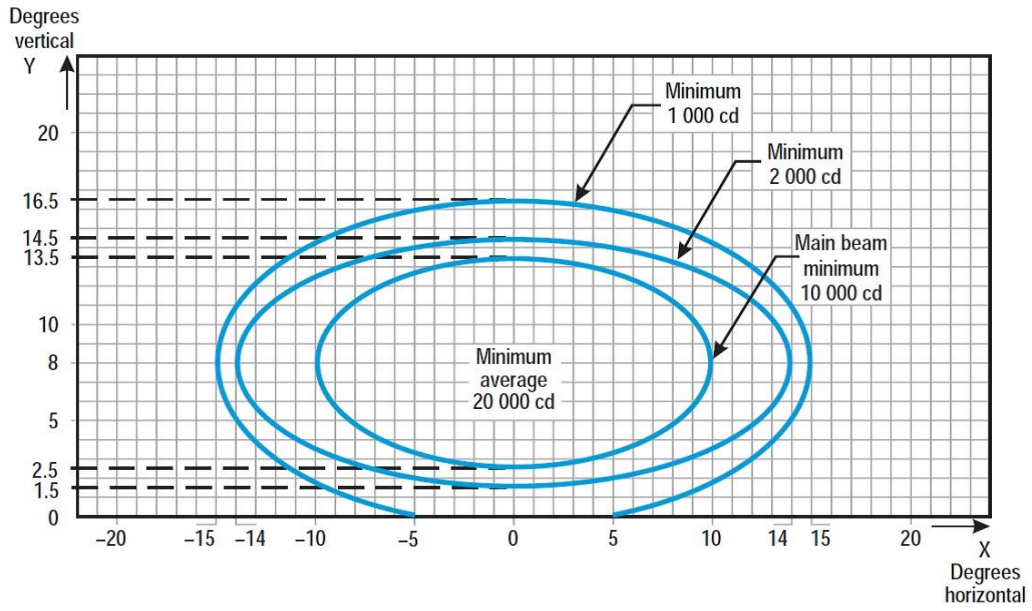


Figure U- 5. Isocandela diagram for approach centre line light and crossbars (white light)

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	10	14	15
b	5.5	6.5	8.5

(b) Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam should be met:

distance from threshold	**vertical main beam coverage**
threshold to 315 m	0° - 11°
316 m to 475 m	0.5° - 11.5°
476 m to 640 m	1.5° - 12.5°

641 m and beyond	2.5° -13.5° (as illustrated above)

(c) Lights in crossbars beyond 22.5 m from the centre line shall be toed-in 2 degrees. All other lights shall be aligned parallel to the centre line of the runway.

(d) See collective notes for Figures U-5 to U-15.

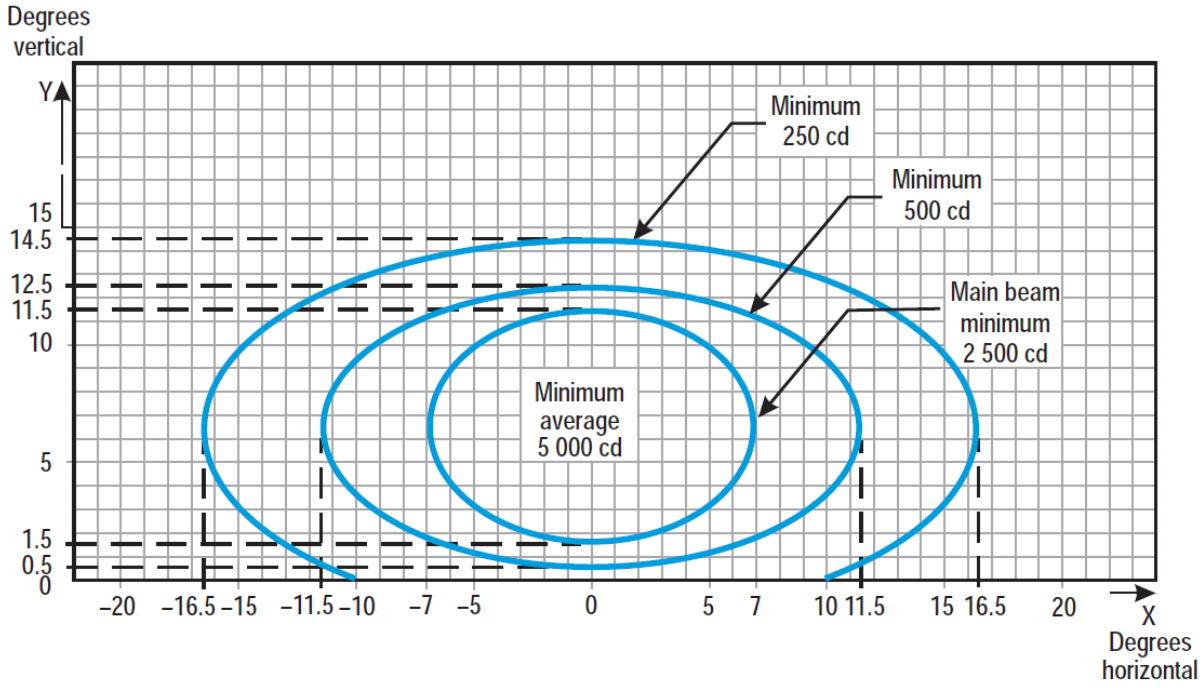


Figure U- 6. Isocandela diagram for approach side row light (red light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

Toe-in 2 degrees

(b) Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam should be met:

distance from threshold	**vertical main beam coverage**

threshold to 115 m	0.5° - 10.5°
116 m to 215 m	01° - 11°
216 m and beyond	1.5° - 11.5° (as illustrated above)

(c) See collective notes for Figures U-5 to U-15.

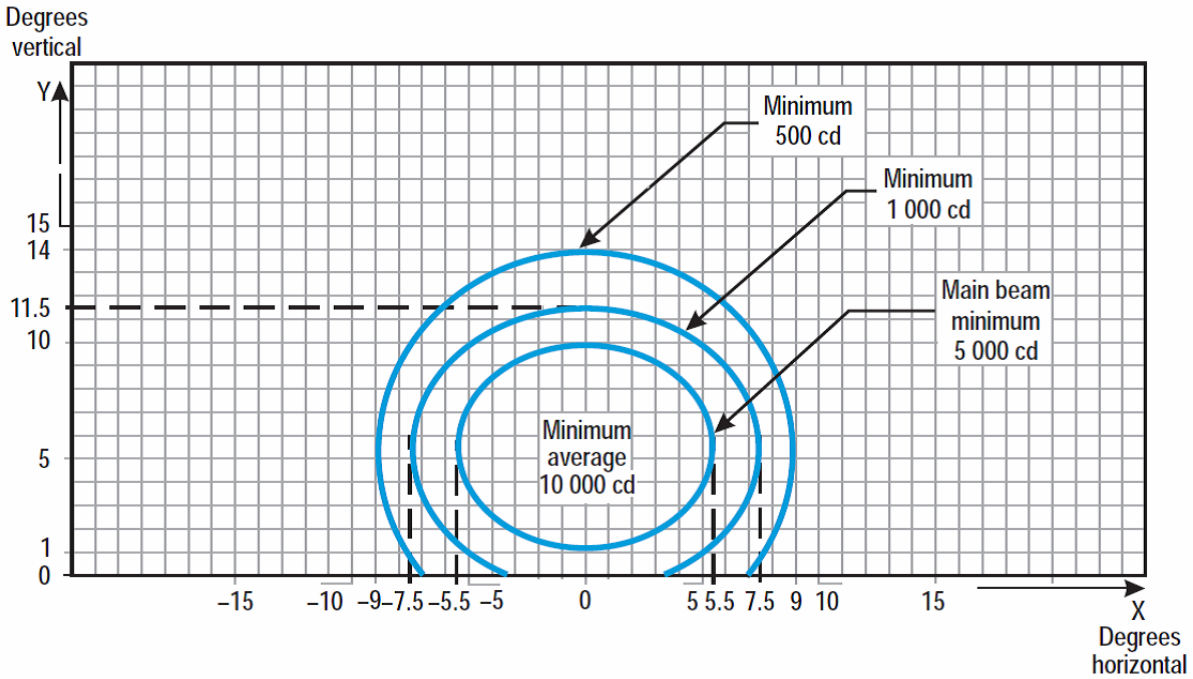


Figure U- 7. Isocandela diagram for threshold light (green light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.5	7.5	9.0
b	4.5	6.0	8.5

(b) Toe-in 3.5 degrees

(c) See collective notes for Figures U-5 to U-15.

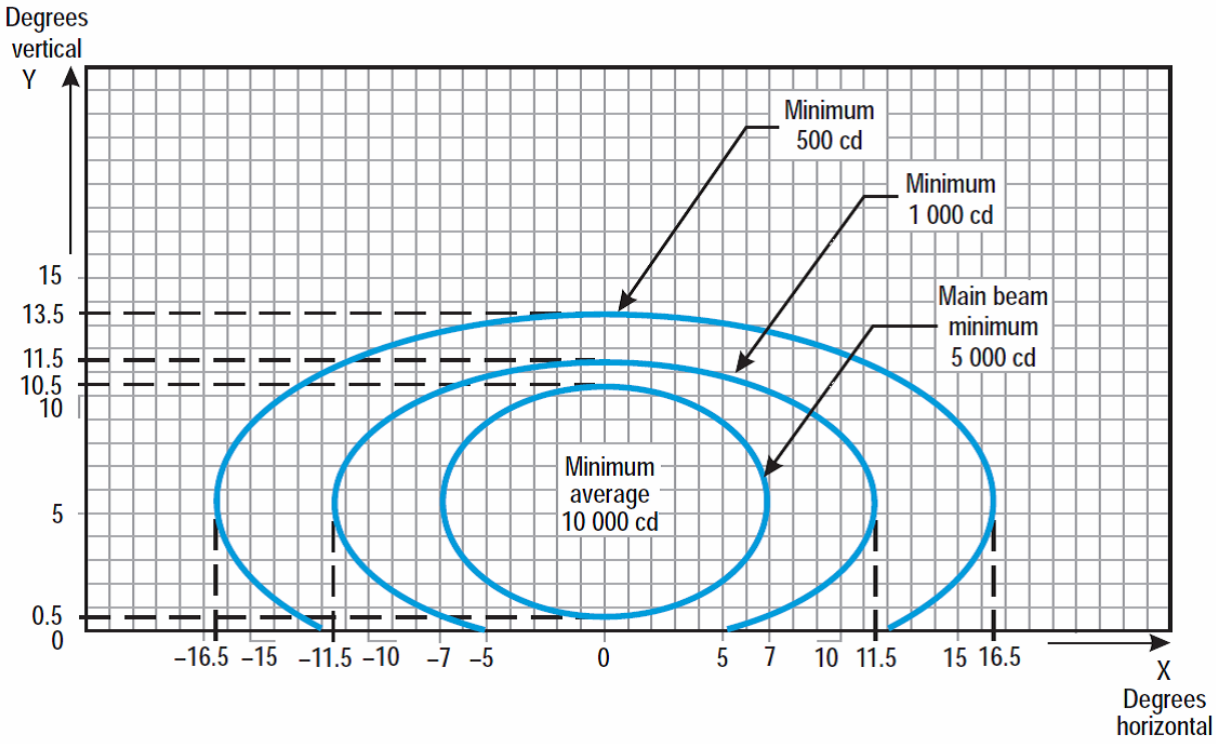


Figure U- 8. Isocandela diagram for threshold wing bar light (green light)

Notes:

(a) Curves calculated on formula

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	a	7.0	11.5	16.5
	b	5.0	6.0	8.0

(b) Toe-in 2 degrees

(c) See collective notes for Figures U-5 to U-15.

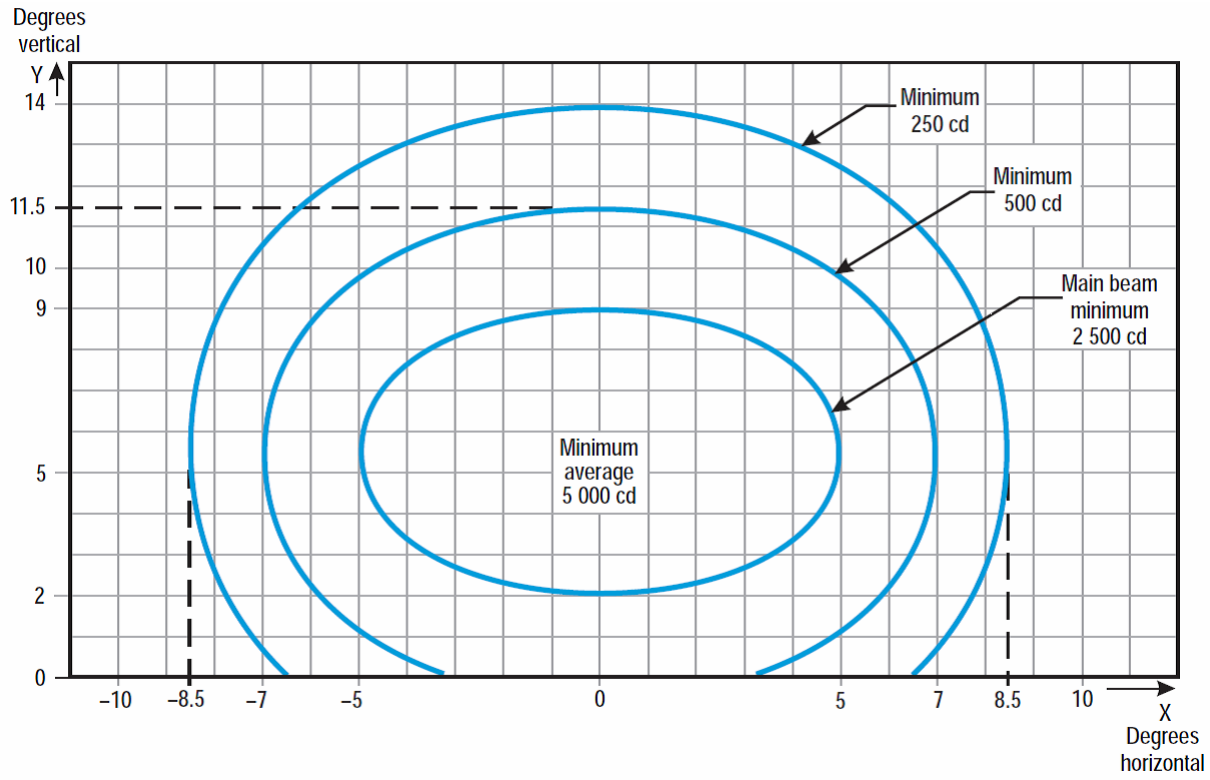


Figure U- 9. Isocandela diagram for touchdown zone light (white light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

(b) Toe-in 4 degrees

(c) See collective notes for Figures U-5 to U-15.

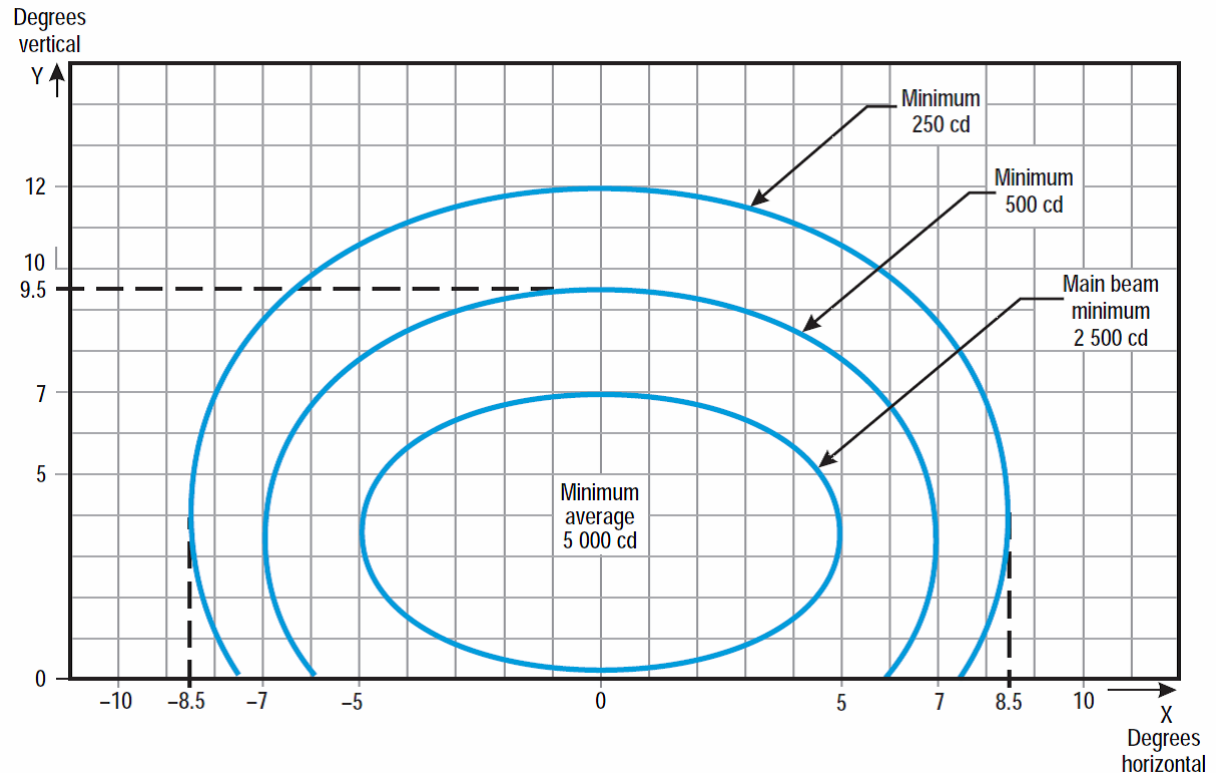


Figure U- 10. Isocandela diagram for runway centre line light with 30 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

(b) For red light, multiply values by 0.15.

(c) For yellow light, multiply values by 0.40.

(d) See collective notes for Figures U-5 to U-15.

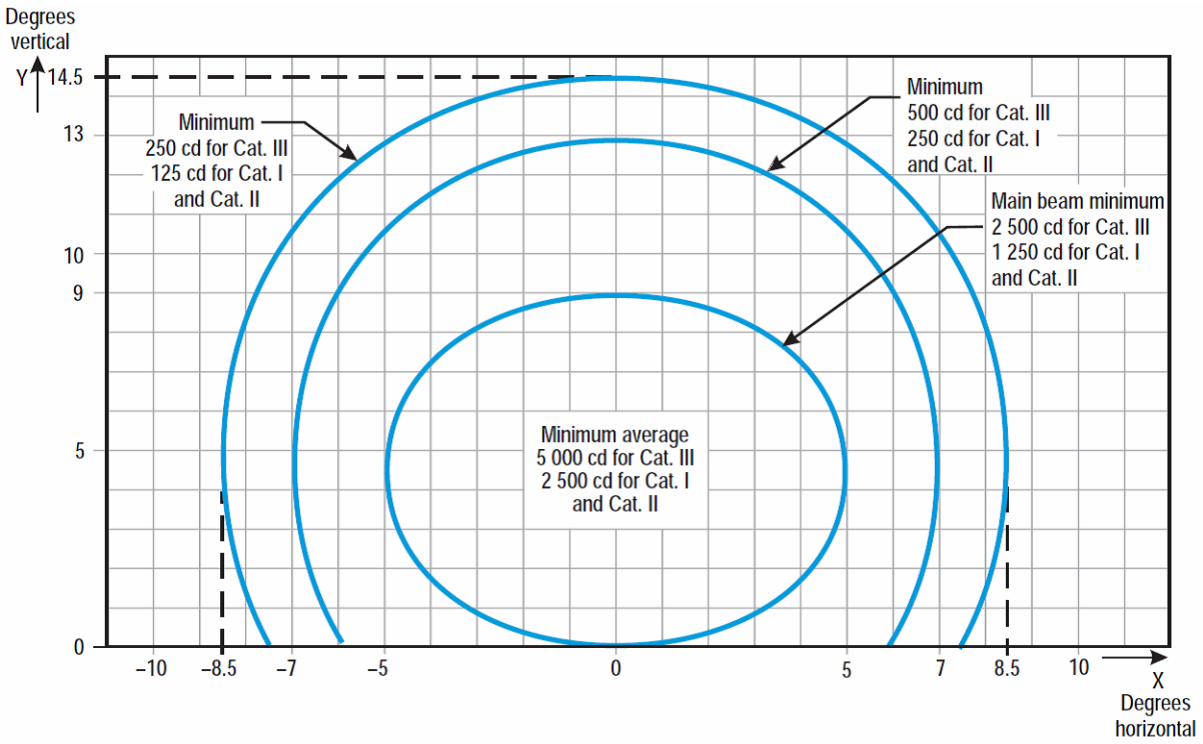


Figure U- 11. Isocandela diagram for runway centre line light with 15 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.0	7.0	8.5
b	4.5	8.5	10

(b) For red light, multiply values by 0.15.

(c) For yellow light, multiply values by 0.40.

(d) See collective notes for Figures U-5 to U-15.

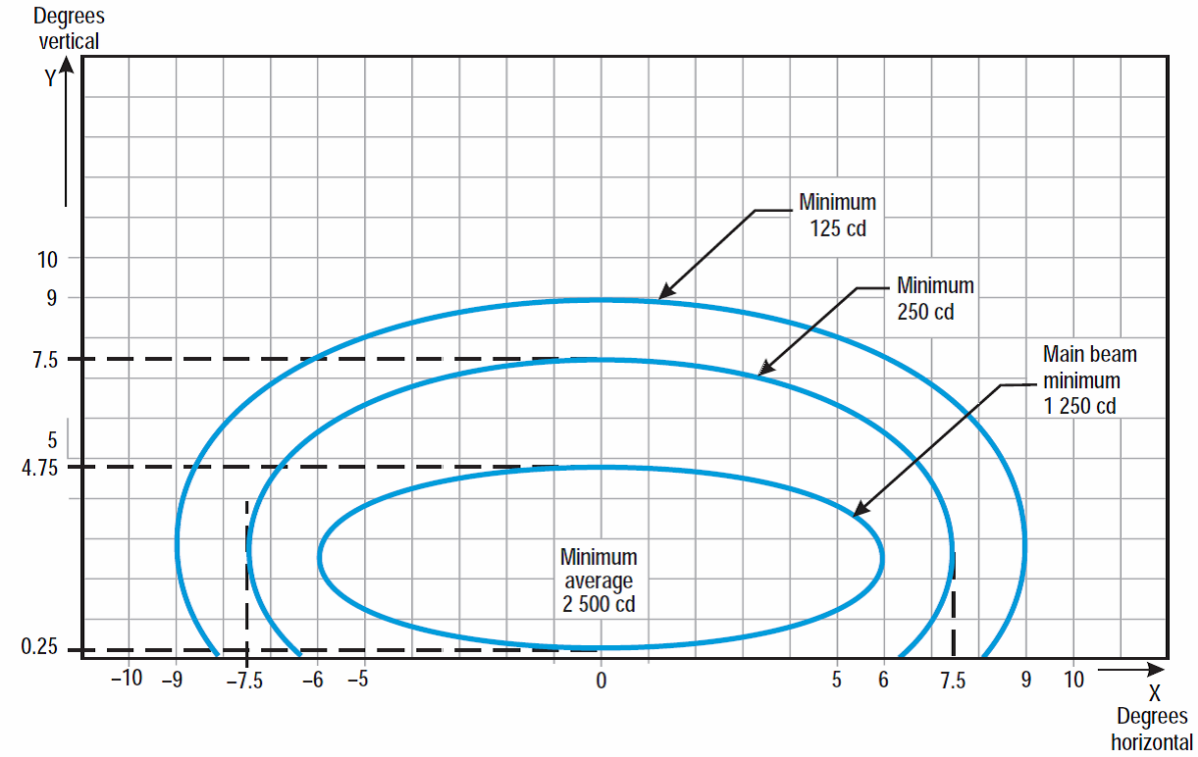


Figure U- 12. Isocandela diagram for runway end light (red light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	6.0	7.5	9.0
b	2.25	5.0	6.5

(b) see collective notes for Figures U-5 to U-15.

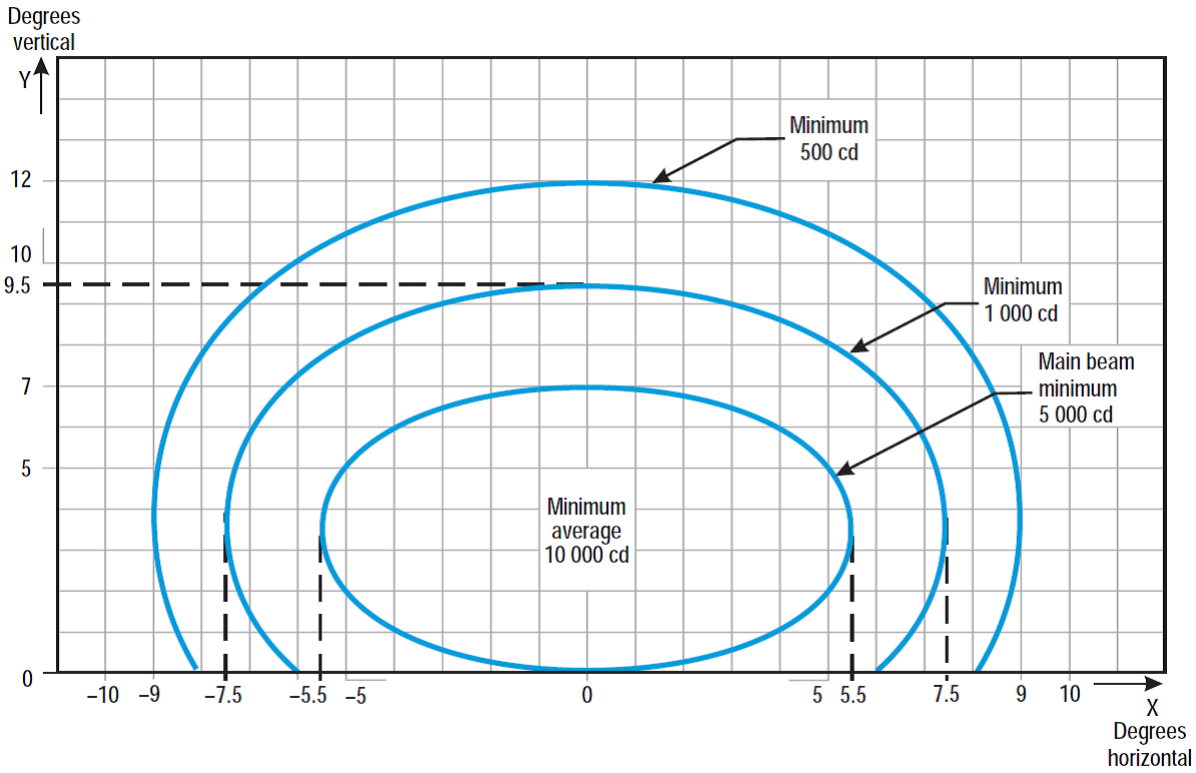


Figure U- 13. Isocandela diagram for runway edge light where width of runway is 45 m (white light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

(b) Toe-in 3.5 degrees

(c) For red light, multiply values by 0.15.

(d) For yellow light, multiply values by 0.40.

(e) See collective notes for Figures U-5 to U-15.

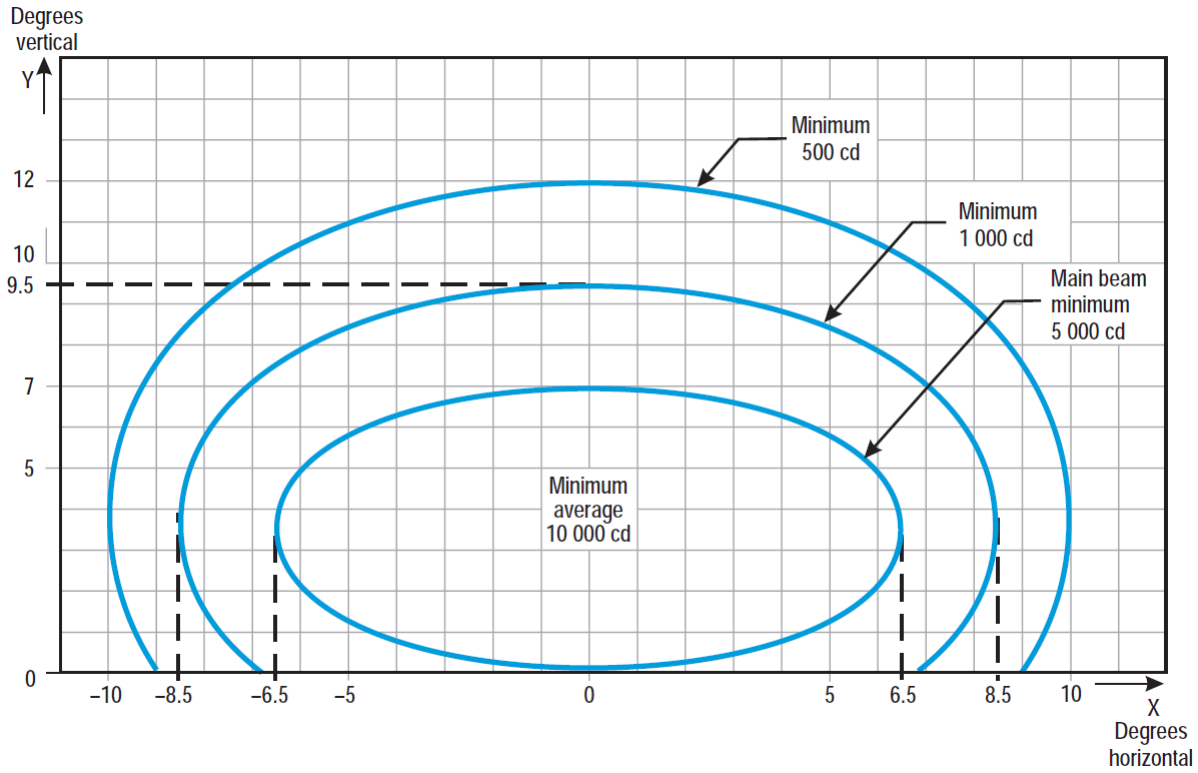


Figure U- 14. Isocandela diagram for runway edge light where width of runway is 60 m (white light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	6.5	8.5	10.0
b	3.5	6.0	8.5

(b) Toe-in 4.5 degrees

(c) For red light, multiply values by 0.15.

(d) For yellow light, multiply values by 0.40.

(e) See collective notes for Figures U-5 to U-15.

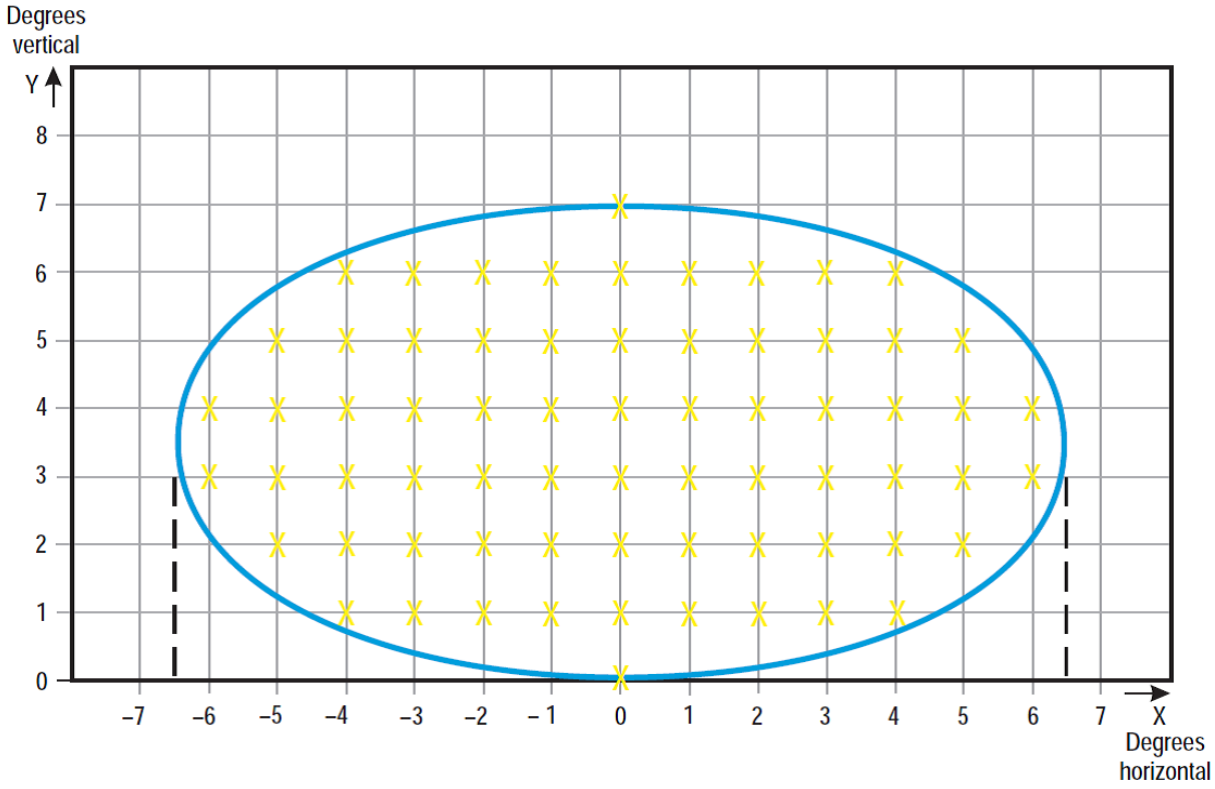


Figure U- 15. Grid points to be used for the calculation of average intensity of approach and runway lights

Collective notes to Figures U-5 to U-15

(a) The ellipses in each Figure are symmetrical about the common vertical and horizontal axes.

(b) Figures U-5 to U-14 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-15 and using the intensity value measures at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.

(c) No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed.

(d) Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average light intensity of the main beam of a new runway edge light should be as follows:

Figure U-5	Approach centre line and crossbars	1.5 to 2.0	(white light)
Figure U-6	Approach side row	0.5 to 1.0	(red light)
Figure U-7	Threshold	1.0 to 1.5	(green light)
Figure U-8	Threshold wing bar	1.0 to 1.5	(green light)
Figure U-9	Touchdown zone	0.5 to 1.0	(white light)
Figure U-10	Runway centre line (longitudinal spacing 30 m)	0.5 to 1.0	(white light)
Figure U-11	Runway centre line (longitudinal spacing 15 m)	0.5 to 1.0 for	(white light)
		0.25 to 0.5 for	(white light)
Figure U-12	Runway end	0.25 to 0.5	(red light)
Figure U-13	Runway edge (45 m runway width)	1.0	(white light)
Figure U-14	Runway edge (60 m runway width)	1.0	(white light)

(e) The beam coverages in the Figures provide the necessary guidance for approaches down to an RVR of the order of 150 m and take-offs down to an RVR of the order of 100 m.

(f) Horizontal angles are measured with respect to the vertical plane through the runway centre line. For lights other than centre line lights, the direction towards the runway centre line is considered positive. Vertical angles are measured with respect to the horizontal plane.

(g) Where, for approach centre line lights and crossbars and for approach side row lights, inset lights are used in lieu of elevated lights, e.g. on a runway with a displaced threshold, the intensity requirements can be met by installing two or three fittings (lower intensity) at each position.

(h) The importance of adequate maintenance cannot be over emphasised. The average intensity should never fall to a value less than 50 % of the value shown in the Figures, and it should be the aim of aerodrome operator to maintain a level of light output close to the specified minimum average intensity.

(i) The light unit should be installed so that the main beam is aligned within one-half degree of the specified.

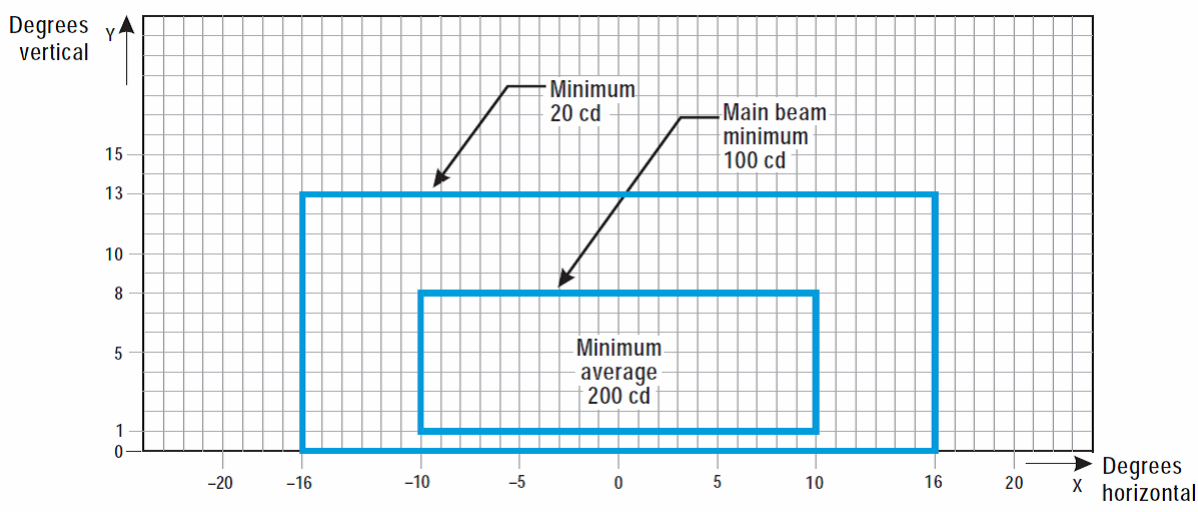


Figure U- 16. Isocandela diagram for taxiway centre line (15 m spacing), RELs, no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration B

Notes:

(a) These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.

(b) See collective notes for Figures U-16 to U-25.

(c) Increased intensities for enhanced rapid exit taxiway centre line lights are four times the respective intensities in the figure (i.e. 800 cd for minimum average main beam).

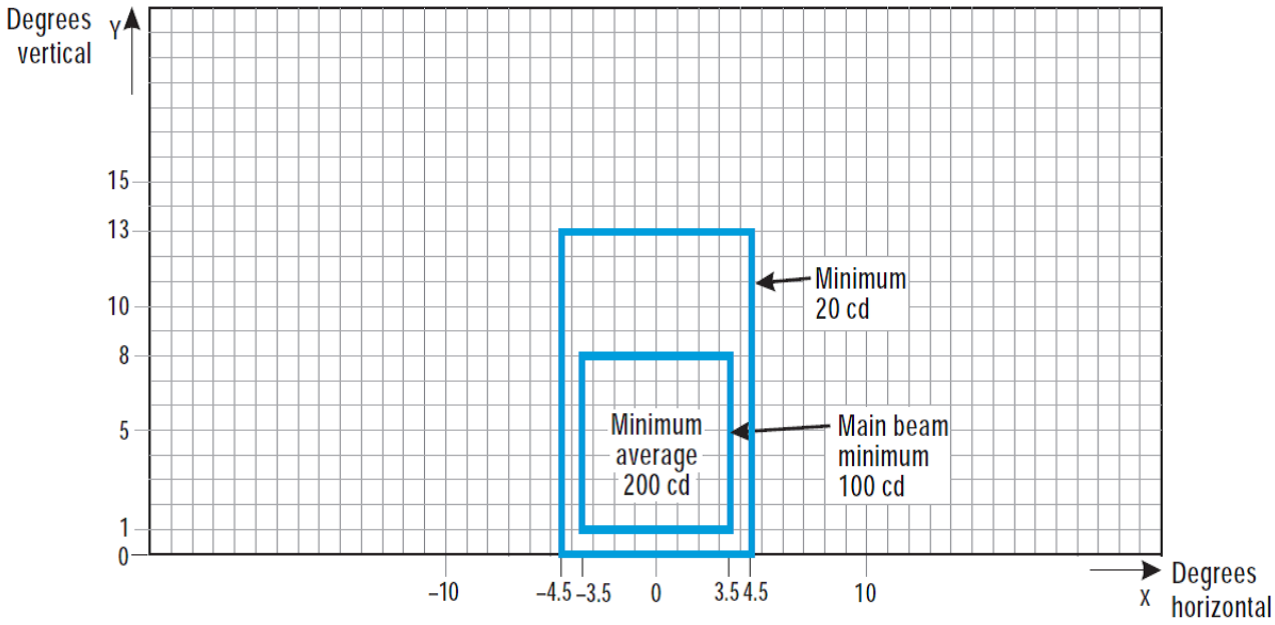


Figure U- 17. Isocandela diagram for taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit from the centre line of approximately 3 m.

(b) See collective notes for Figures U-16 to U-25.

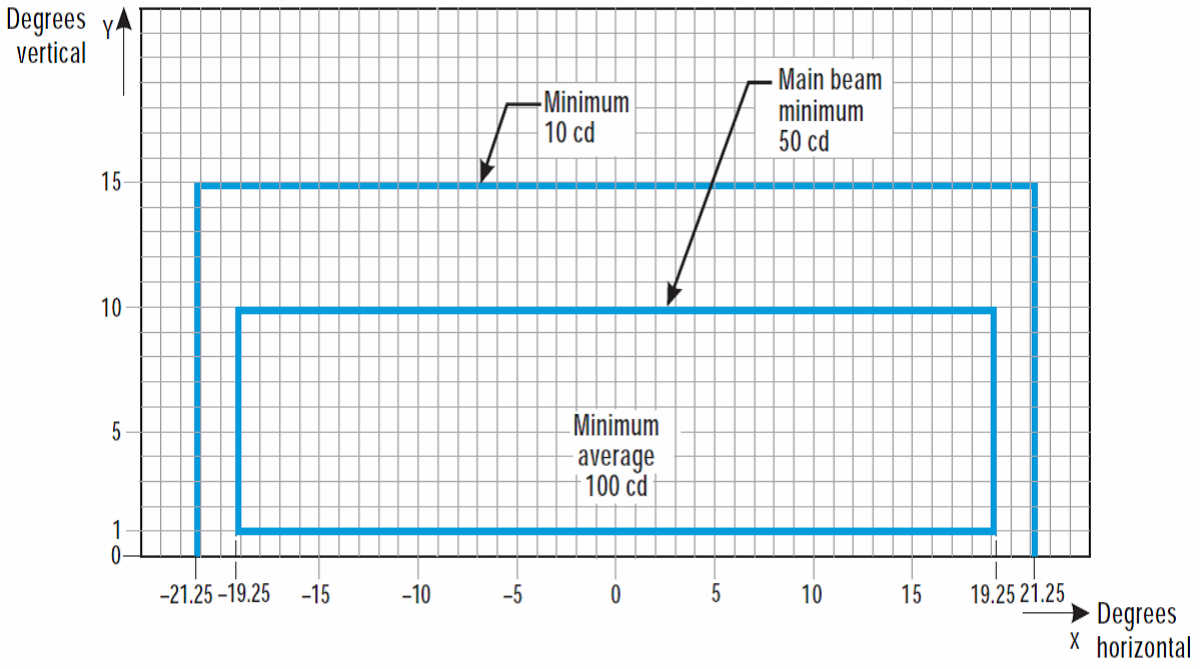


Figure U- 18. Isocandela diagram for taxiway centre line (7.5 m spacing), RELs, no-entry bar, and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:

(a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve. This does not apply to RELs.

(b) Where provided, increased intensities for RELs should be twice the specified intensities, i.e. minimum 20 cd, main beam minimum 100 cd, and minimum average 200 cd.

(c) See collective notes for Figures U-16 to U-25.

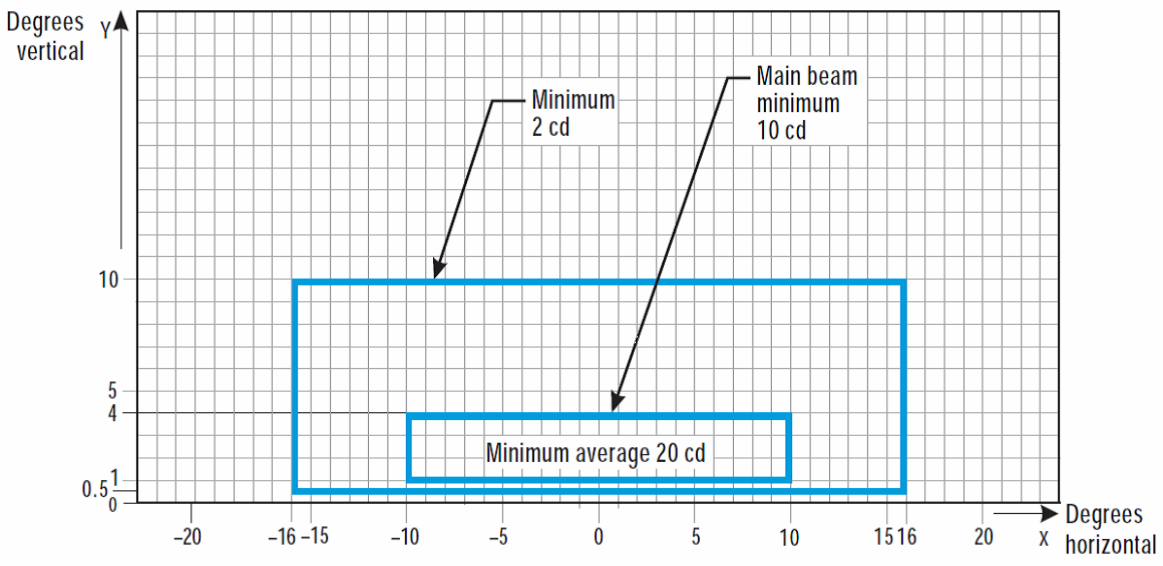


Figure U- 19. Isocandela diagram for taxiway centre line (30 m, 60 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of 350 m or greater

Notes:

(a) At locations where high background luminance is usual, and where deterioration of light output resulting from dust and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

(b) Where omnidirectional lights are used they should comply with the vertical beam requirements in this Figure.

(c) See collective notes for Figures U-16 to U-25.

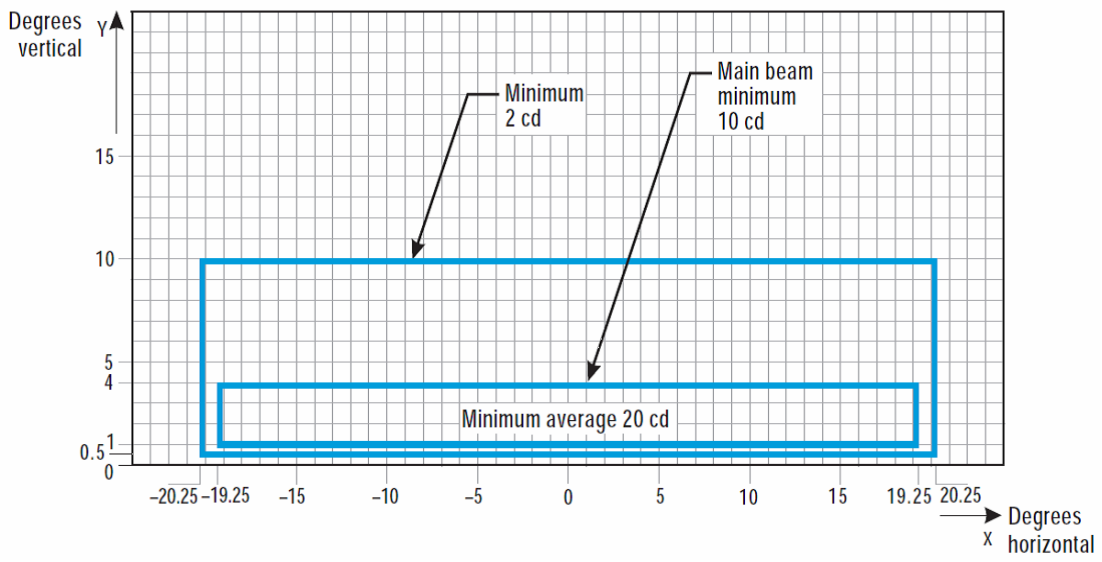


Figure U- 20. Isocandela diagram for taxiway centre line (7.5 m, 15 m, 30 m spacing), no-entry bar, and stop bar lights in curved sections intended for use in runway visual range conditions of 350 m or greater

Notes:

(a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.

(b) At locations where high background luminance is usual and where deterioration of light output resulting from dust and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

(c) These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m as could occur at the end of curves.

(d) See collective notes for Figures U-16 to U-25.

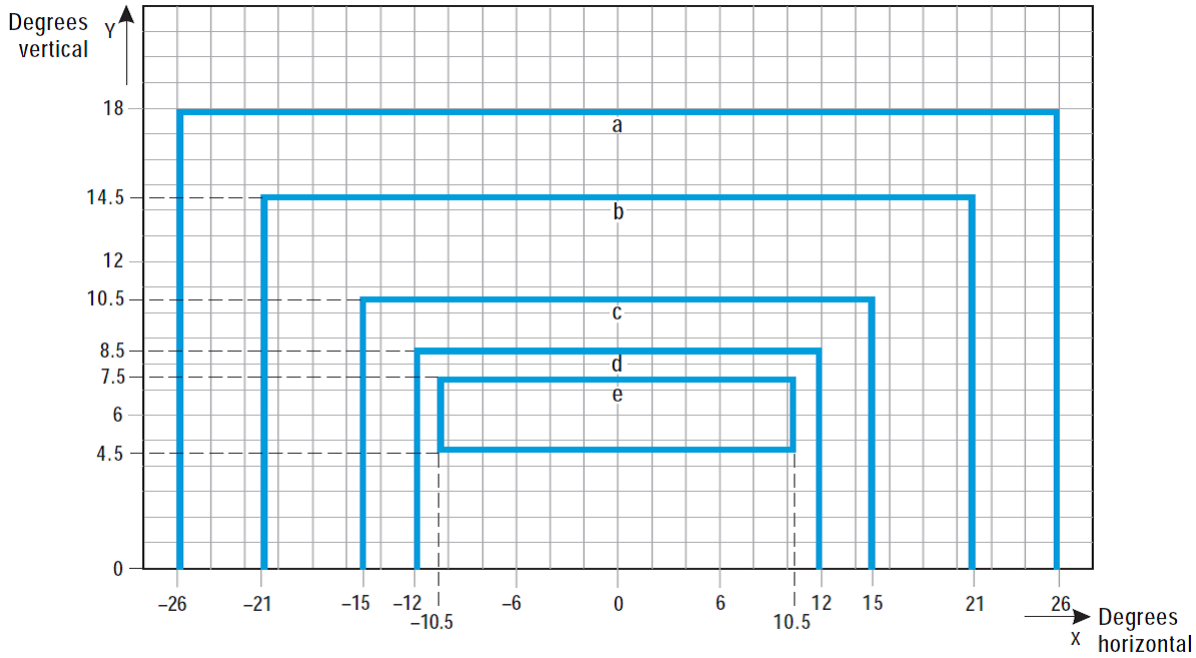


Figure U- 21. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required and where large offsets can occur.

Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1800

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.

(b) See collective notes for Figures U-16 to U-25.

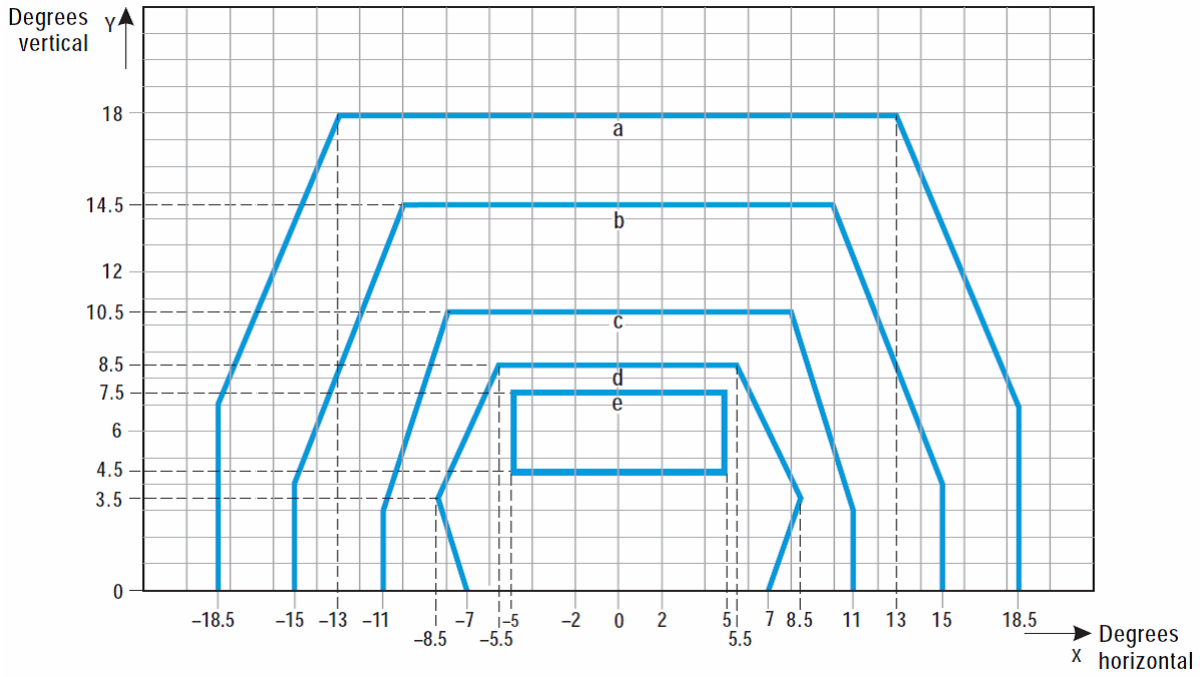


Figure U- 22. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1800

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.

(b) See collective notes for Figures U-16 to U-25.

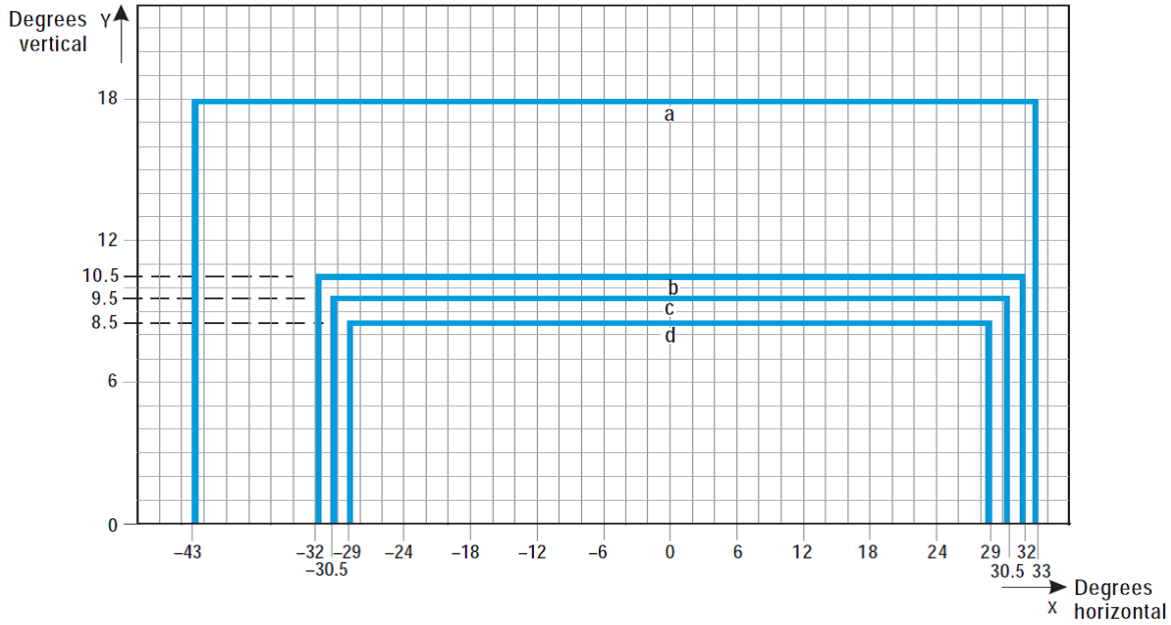


Figure U- 23. Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing), no-entry bar, and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Curve	a	b	c	d
Intensity (cd)	8	100	200	400

Notes:

(a) Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.

(b) See collective notes for Figures U-16 to U-25.

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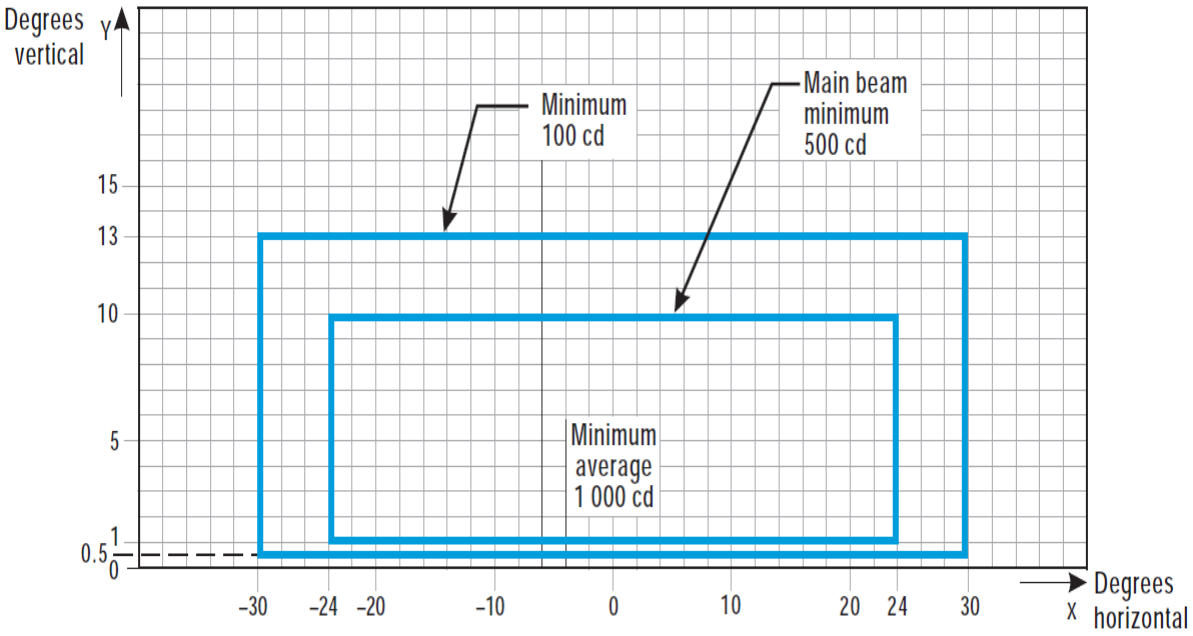


Figure U- 24. Isocandela diagram for high-intensity runway guard lights, Configuration B

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) See collective notes for Figures U-16 to U-25.

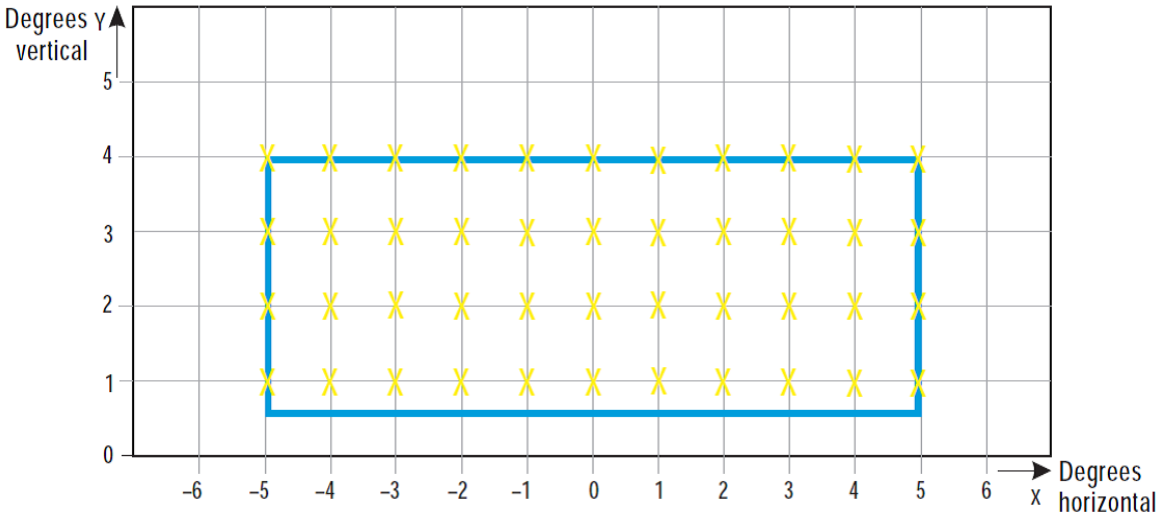


Figure U- 25. Grid points to be used for calculation of average intensity of taxiway centre line and stop bar lights

Collective notes to Figures U-16 to U-25:

(a) The intensities specified in Figures U-16 to U-24 are in green and yellow light for taxiway centre line lights, yellow light for runway guard lights, and red light for stop bar lights.

(b) Figures U-16 to U-24 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-25, and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.

(c) No deviations are acceptable in the main beam or in the innermost beam as applicable, when the lighting fixture is properly aimed.

(d) Horizontal angles are measured with respect to the vertical plane through the taxiway centre line, except on curves where they are measured with respect to the tangent to the curve.

(e) Vertical angles are measured from the longitudinal slope of the taxiway surface.

(f) The importance of adequate maintenance cannot be over emphasised. The intensity, either average where applicable or as specified on the corresponding Isocandela curves, should never fall to a value less than 50 % of the value shown in the figures, and it should be the aim of aerodrome operator to maintain a level of light output close to the specified minimum average intensity.

(g) The light unit should be installed so that the main beam or the innermost beam as applicable, is aligned within one-half degree of the specified requirement.

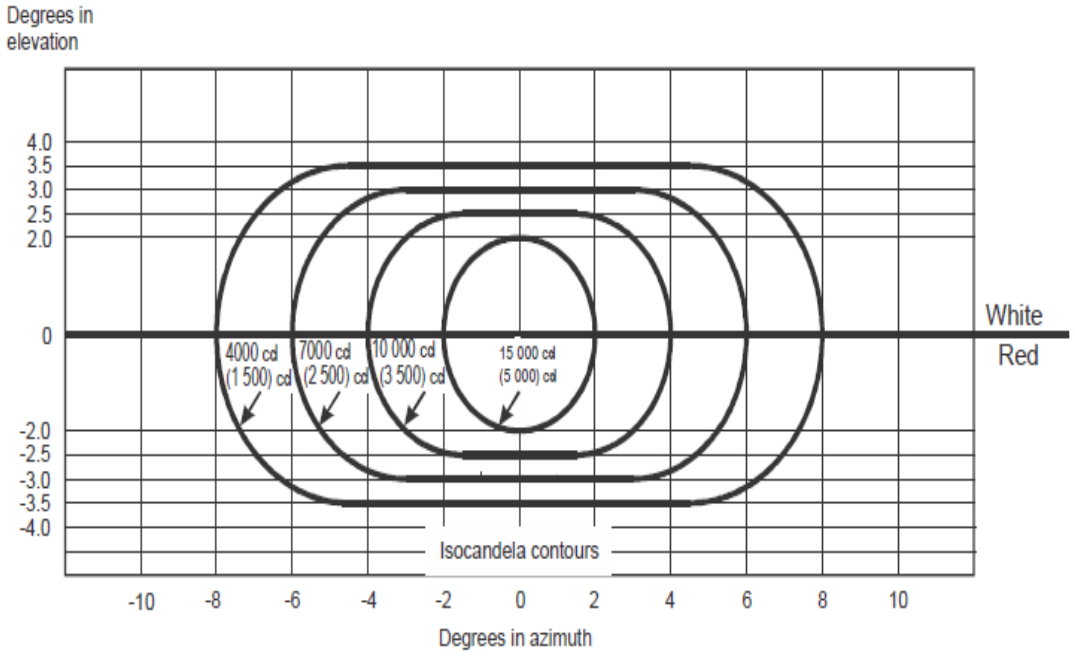


Figure U- 26. Light intensity distribution of PAPI and APAPI

Notes:

(a) These curves are for minimum intensities in red light.

(b) The intensity value in the white sector of the beam is no less than 2 and may be as high as 6.5 times the corresponding intensity in the red sector.

(c) The intensity values shown in brackets are for APAPI.

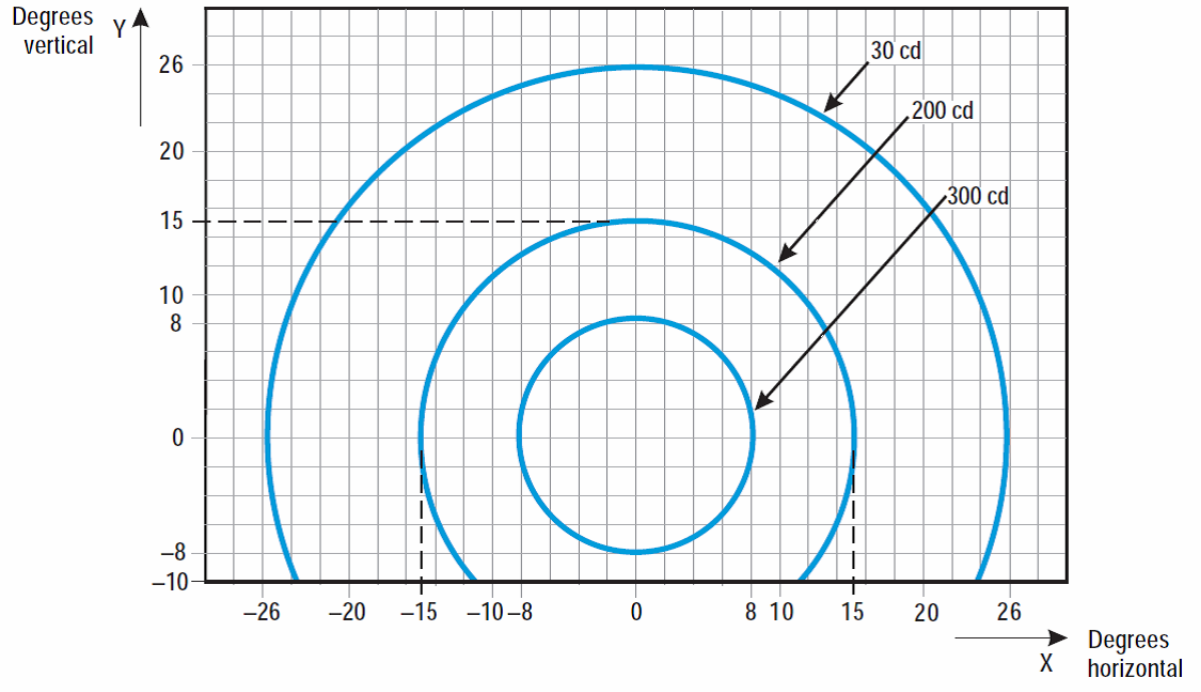


Figure U- 27. Isocandela diagram for each light in low-intensity runway guard lights, Configuration A

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) The intensities specified are in yellow light.

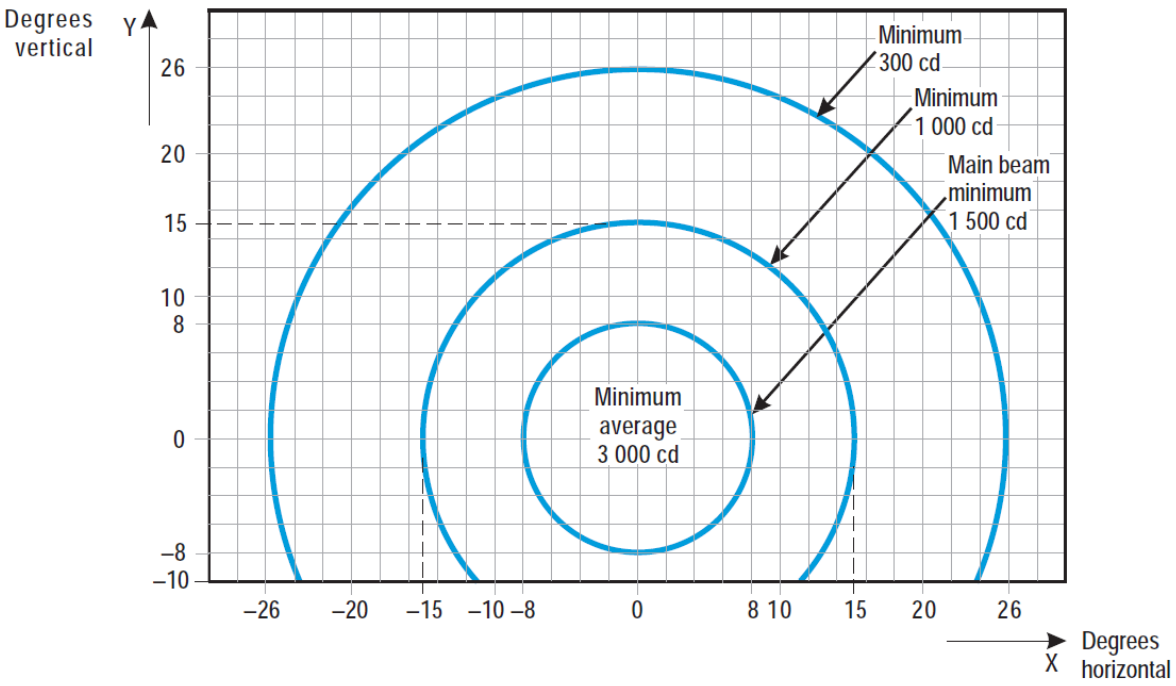


Figure U- 28. Isocandela diagram for each light in high-intensity runway guard lights, Configuration A

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) The intensities specified are in yellow light.

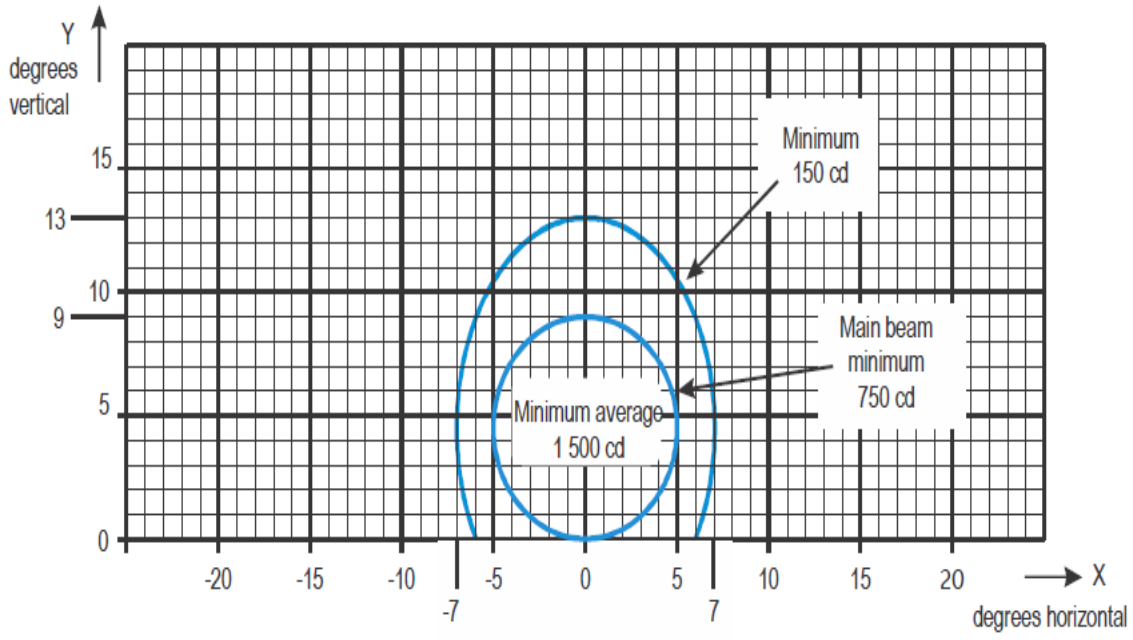


Figure U- 29.Isocandela diagram for take-off and hold lights (THL) (red light)

Notes:

(a) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	5.0	7.0
b	4.5	8.5

(b) See collective notes

SUBPART - CERTIFICATION SPECIFICATIONS AND GUIDANCE MATERIAL FOR WATER AERODROMES (PART WCS-ADR-WDSN)

WCS-ADR-WDSN. B.001 Applicability

Applicability

The water aerodrome criteria are designed to cater for day, Visual Flight Rules (VFR) operations only; they do not cater for night, Instrument Meteorological Conditions (IMC).

GM1.WCS-ADR-WDSN.B.001 Applicability

(a) All aircraft on water shall comply with requirements of the International Regulations for Preventing Collisions at Sea, harbour regulations and local byelaws that are not addressed in this document.

(b) Operations on water differ significantly from those conducted on land and as such, the criteria for land aerodromes maybe inappropriate in some areas. Although based on the existing land aerodrome criteria, the different operational and safety risks when operating onto and from water, particularly in more challenging environments have to be addressed.

WCS-ADR-WDSN. B.005 Aerodrome Reference Point (ARP)

The Aerodrome Reference Point (ARP) shall be established. The ARP shall be located near the initial or planned geometric centre of the aerodrome.

WCS-ADR-WDSN. B.010 Aerodrome Reference Elevation

An Aerodrome Reference Elevation shall be determined at the ARP.

GM1 WCS-ADR-WDSN.B.010 Aerodrome Reference Elevation

(a) The Aerodrome Reference Elevation is located at the planned geometric centre of the Manoeuvring Area or of the main one if more than one is provided.

(b) The Aerodrome Reference Elevation should be determined from the chart height, or from the lowest recorded water level, converted to an elevation in feet above the local datum established by the emirate in which the aerodrome is located.

WCS-ADR-WDSN. B.015 Movement Area

Aerodrome operators shall determine the area of any land and water on which seaplane operations may take place. It is this area that shall be declared as the movement area.

One or more Manoeuvring Area(s) shall be established within the Movement Area from which all seaplane operations requiring the use of an aerodrome shall take place.

WCS-ADR-WDSN. B.020 Manoeuvring Area

The available manoeuvring area shall be large enough to provide a choice of take-off and landing direction, dependent upon prevailing water surface and weather conditions.

The manoeuvring area shall encompass all parts of the water surface intended for the taking off and landing of seaplanes.

GM1 WCS-ADR-WDSN.B.020 Manoeuvring Area

(a) The manoeuvring area(s) should be square, rectangular or rhomboidal in shape.

(b) In other cases, such as on a narrow inlet, it may be more appropriate to provide a Manoeuvring Area that caters for take-off and landing in one direction and its reciprocal only, in a direction parallel to the longer sides of the Manoeuvring Area.

WCS-ADR-WDSN. B.025 Number and Orientation of water runways

The number of water runways at a water aerodrome and their orientation should be such that, for a large percentage of time as practicable but for not less than 95 percent there is at least one water runway for which the surface wind velocity component at right angles to its longitudinal axis will not preclude the landing or taking off of seaplane that the water aerodrome is intended to serve.

GM1 WCS-ADR-WDSN.B.025 Number and orientation of water runways

The number of usable water runways at a water aerodrome and their geographic orientation should minimize the effect of the local surface wind direction, velocity component, existing obstacles and noise pollution to neighbouring human habitat as much as possible.

WCS-ADR-WDSN.B.030 Length of water runways

The length of the water runway to be provided should be adequate to meet the operational requirements (take-off and landing) of the critical seaplane for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant seaplanes.

WCS-ADR-WDSN.B.035 Width of water runways

The width of the water runway should be not less than 60 m wherever practicable.

WCS-ADR-WDSN.B.40 Water Depth

The depth of the water measured at low water level in the water runway should not be less than 1.8 m (6 ft.) or less than 0.3 m below the hull or floats when the seaplane is stationary and loaded to maximum take-off weight.

WCS-ADR-WDSN.B.45 Water runway strip

A protective buffer should extend on each side from the edge of the water runway to a distance of not less than 30 m (100 ft.) and on each end of the water runway to a distance of 60 m wherever practicable.

No fixed object should be permitted on a water runway or on a water runway strip unless it is being used for aeronautical purposes.

WCS-ADR-WDSN.B.50 Turning basins

Turning basins should be provided at the end of the water runway, whenever necessary.

When turning basins are provided it shall have:

(a) A diameter measured at low water level of not less than twice the specified minimum width of the corresponding water runway;

(b) The depth of turning basins measured at low water level should be at least that of the corresponding water runway; and

(c) A horizontal obstruction clearance between the edge of the turning basin and the nearest obstacle of no less than 15 m (50 ft.).

WCS-ADR-WDSN.B.55 Taxi channels

(a) Taxi channels should be provided to permit the safe, orderly and expeditious handling of aerodrome traffic. Where provided, the taxi channels shall have a width of not less than 45 m, wherever practicable.

(c) Wingtip to wingtip clearance for passing seaplanes (dual directional taxi channels) should be not less than of 15 m (50 ft.) .

(d) The depth of the water measured at low water level in the taxi channel should not be less than 1.8 m (6 ft.) or less than 0.3 m below the hull or floats when the seaplane is stationary and loaded to maximum take-off weight.

WCS-ADR-WDSN.B.60 Mooring areas

Mooring areas should be provided, whenever necessary, for the mooring of seaplane and to permit the embarkation and disembarkation of passengers, loading and unloading of cargo and mail without interfering with the aerodrome traffic.

When mooring areas are provided:

(a) The size of the mooring areas should be adequate to permit expeditious handling of the peak hour traffic.

(b) The depth of water at the mooring area measured at low water level should be at least that of the corresponding taxi channel.

(c) The mooring area shall be designed in such a manner as to provide a minimum clearance of 15 m (50 ft.) between any part of the seaplane and any object it could come into contact with depending on water level.

WCS-ADR-WDSN.B.065 Shore facilities

A platform (fixed or floating), ramp or beach should be provided to permit the embarking and disembarking of passengers and crew, loading and unloading of cargo and refueling.

(a) Where a platform is provided it shall:

(1) be in a condition that permits constant use without causing injury to persons or damage to aircraft;

(2) be attached or anchored in a manner that prevents it from shifting position or becoming detached;

(3) have access from the shore that provides for the safe movement of crew and passengers; and

(4) have at least two bull rails or provision for appropriate number of tie-down cleats at each seaplane parking position to secure the seaplane.

(b) Where a ramp or beach is provided it shall be:

(1) built 1.5 times the width of floats or landing gear of the largest seaplane intended to use the facility;

(2) located in such a manner as to provide a minimum clearance of 1.8 m (6 ft.) between a seaplane wing and any object it could come into contact with;

(3) constructed with a slope not steeper than 8:1.

(c) When a seaplane is normally secured in a position where any seaplane component overhangs the platform and constitutes a hazard to the movement of crew and passengers, the hazard shall be clearly indicated by means of:

(1) cones; and/ or

(2) hashed red and white markings; and

(3) in a manner easily identifiable to crew and passengers.

WCS-ADR-WDSN.B.070 Obstacle limitation surfaces

(a) The following OLS shall be established for non-instrument water aerodromes

(1) a take-off climb/approach surface;

(2) a transitional surface; and

(3) an inner horizonal surface

(b) Declaration of the Obstacle Limitation Surfaces shall be made by the Aerodrome Operator and shall be supported by an Aeronautical Study.

GM1. WCS-ADR-WDSN.B.070 Obstacle limitation surfaces

(a) When determining the extent of the Obstacle Limitation Surfaces, account should be taken of all factors that significantly affect the performance of the largest seaplane likely to operate from the water aerodrome;

(b) Factors that significantly affect performance include, but are not limited to: maximum certificated take-off mass, operating procedures, temperature, wind, water surface condition and constrains by property boundaries or topographical features;

(c) When it is not be possible or practicable in some locations to establish an inner horizontal surface due to terrain or local factors,, procedures could be established to ensure an acceptable level of safety.

WCS-ADR-WDSN.B.075 Take-off climb and Approach surfaces

The take-off climb/approach surface shall be either straight or curved and established at the end/beginning of the water runway strip.

Characteristics – The limit of the take-off climb /approach surface shall be:

(a) The width of the inner edge shall not be less than that of the associated water runway strip

(b) The inner edge shall start at 60 m from threshold of water runway;

(c) The elevation of the inner edge shall be the elevation of the water aerodrome;

(d) The length of the take-off climb /approach surface shall not be less than 2500 m (8200 ft.) from the inner edge;

(e) The slope of the take-off climb/approach surface shall be a minimum of 4 % (1:25);

(f) The centre line of the take-off climb/approach surface shall define the approach path and be:

(1) a straight line; or

(2) an arc of constant radius; or

(3) a combination of a straight line and an arc of constant radius.

WCS-ADR-WDSN.B.080 Straight-in take-off climb / Approach Surface

Where the slope is designed for a straight-in approach the divergence of the take-off climb/approach surface shall be set at 10% starting from the inner edge.

WCS-ADR-WDSN.B.085 Curved take-off climb / Approach Surface

(a) Where established, a curved take-off climb/approach surface shall not contain more than one curved portion.

(b) A curved portion of a take-off climb/approach surface shall not allow a change of direction greater than 90 degrees.

(c) Where a curved portion of take-off climb/approach surface is provided:

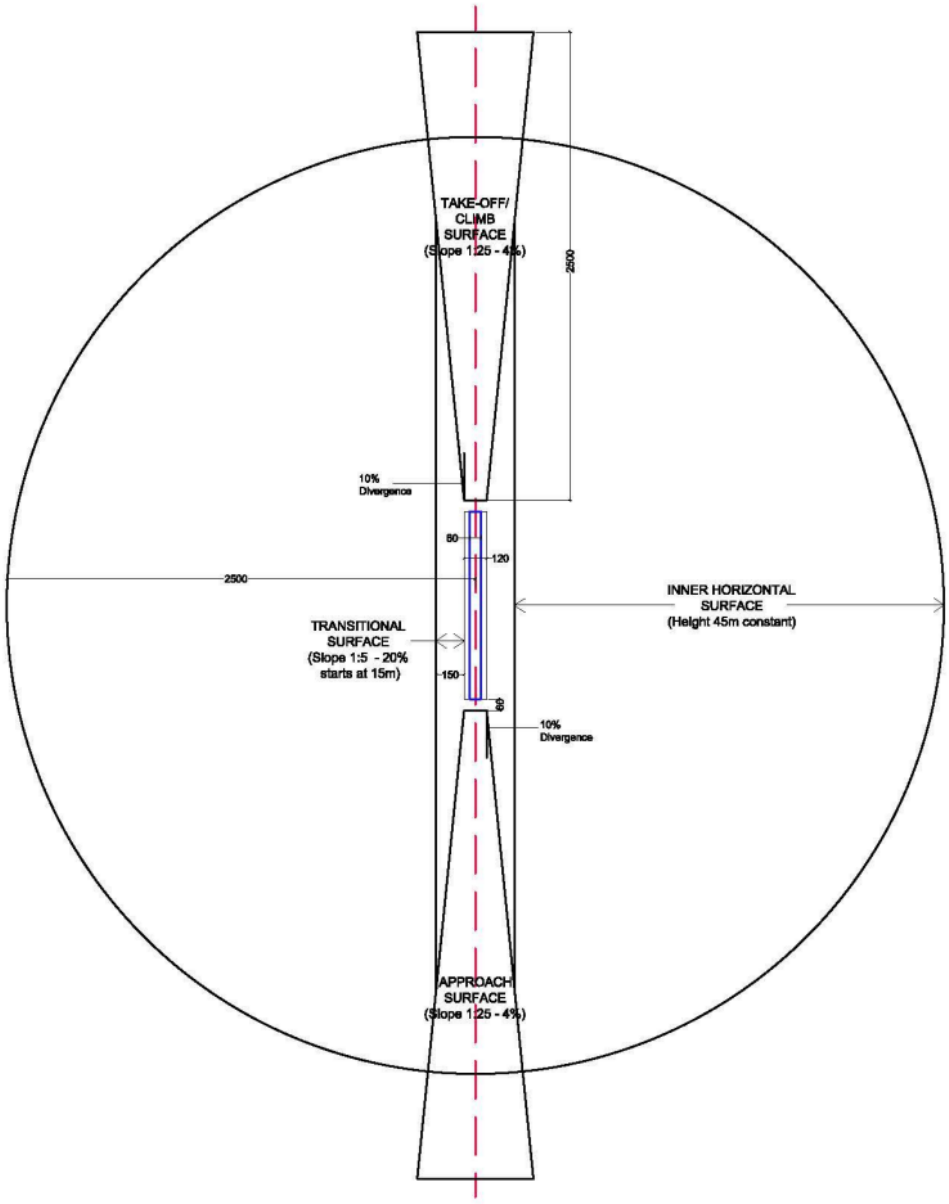
(1) the straight portion originating at the inner edge shall not be less than 1300 m (4265 ft.); and

(2) the radius of arc defining the centre line of the take-off climb/approach surface shall not in any portion of the take-off climb/approach surface be less than 736 m (2415 ft.) in accordance with the figure below.

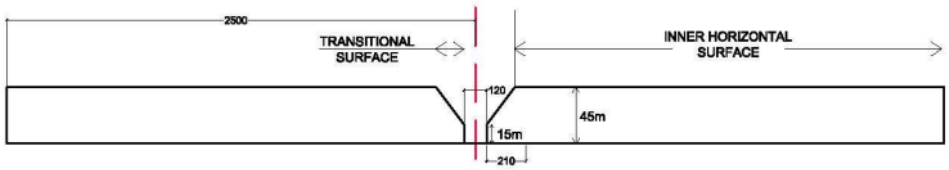
(d) A take-off climb/approach surface incorporating a curved portion shall be established only where guidance, such as, geographical points or other visual references are available.

Note. — An offset curved approach is normally established at a non-instrument water runway where it is necessary to avoid obstacles, terrain, noise sensitive areas, or to utilise the airspace above public lands (e.g. freeways, rivers, golf courses).

WATER AERODROME
OBSTACLE LIMITATION SURFACE



PLAN VIEW



ELEVATION

Dimensions are given in Meters

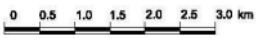


Figure WCS 1: Obstacle Limitation Surface

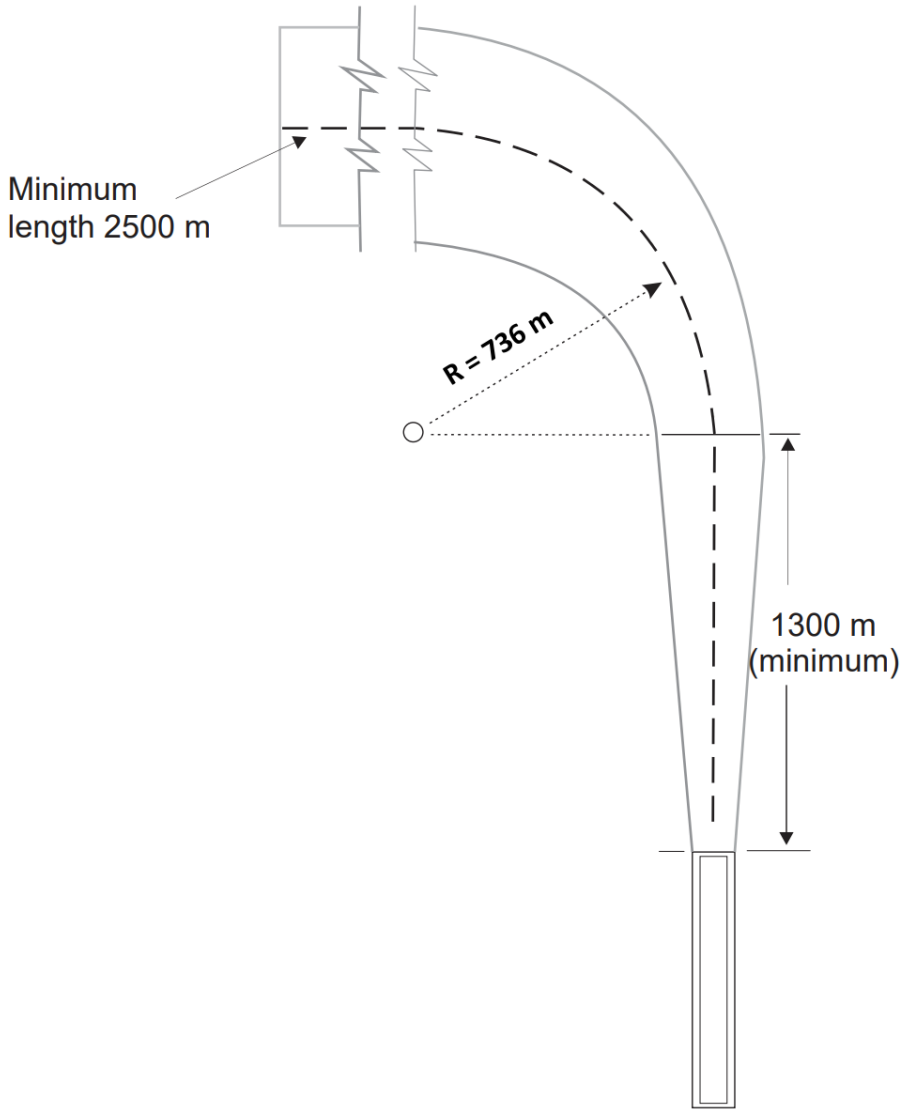
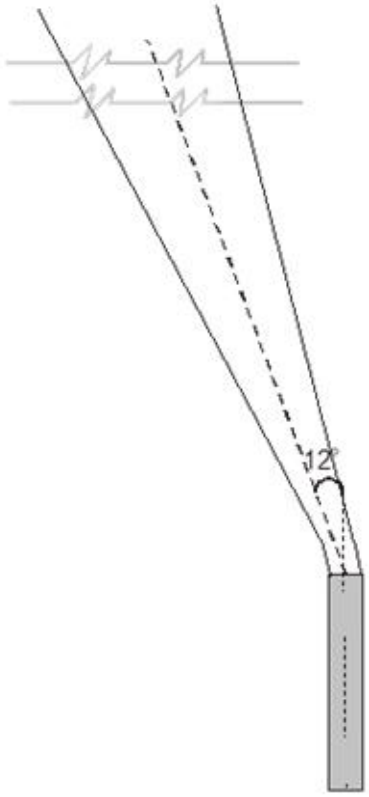


Figure WCS 2 : Curved Take-off climb/ Approach surface



Note : *The minimum length of the centre line is 2500 m*

Figure WCS 3: Offset Take-off Climb/ Approach Surface

WCS-ADR-WDSN.B.090 Dimensions and slopes of OLS

Approach type – Non-instrument	
Take-off climb/approach surface	
Width of inner edge	Width of water runway strip - (120 m minimum)
Location of inner edge	60 m from the threshold
Divergence Take-off climb/approach surface	10%
Length (minimum)	2,500 m
Slope of take-off climb/approach surface (maximum)	4% (1:25)
Transitional surface	
Slope (maximum)	Vertical to 15 m then 1:5 (20%)
Inner Horizontal Surface (where provided)	
Height	45 m
Radius	2,500 m

WCS-ADR-WDSN.B.095 Displaced Threshold

(a) Where the integrity of the approach surface cannot be maintained due to fixed or mobile obstacles, a landing threshold shall be displaced from the normal threshold.

(b) This displacement shall be established so that the new approach surface, starting at the displacement, will clear all obstacles.

(c) Where a threshold has been displaced, the inner edge of approach surface shall be located at 60 m from the point of displacement.

WCS-ADR-WDSN.B.100 Objects and obstacles

(a) No fixed object shall be permitted on a water runway or on a water runway strip.

(b) Fixed objects or structures that are located within the water aerodrome boundary shall not penetrate OLS unless:

(1) those structures are for air navigation purposes; or

(2) are essential to the safety of aircraft operation;

(3) are marked, in accordance with CAR AGA Part ADR;

(4) are frangible.

(c) A mobile object shall not penetrate take-off climb/approach surfaces, unless procedures are in place to ensure the object is removed during approach and departure operation

WCS-ADR-WDSN.B.105 Other objects

(a) Where an aeronautical study (safety risk assessment) indicates that an object is hazardous to seaplane located on the movement area or in the air in the immediate vicinity of the water aerodrome, it shall be:

(1) removed; or

(2) marked; and/or

(3) lighted in accordance with CAR AGA, Part ADR.

(b) The water aerodrome operator shall conduct a safety risk assessment to establish the required clearances to be used above waterways, lagoons, or harbor.

WCS-ADR-WDSN.B.110 Wind direction indicator

(a) Unless the direction of the wind can be obtained by radio, at least one wind direction indicator shall be installed.

(b) Where a wind direction indicator is installed it shall be:

(1) of an international orange, orange and white or red and white colour; and

(2) in the form of a truncated cone.

(c) The wind direction indicator should be:

(1) visible at a height of 300 m (1000 ft.) above the water runway; and

(2) visible from any portion of the manoeuvring area.

WCS-ADR-WDSN.B.115 Markings –Platform/ Dock identification marking

(a) Platform / Dock identification markings shall consist of:

(1) triangle;

(2) painted bull rails

Both markings shall be affixed to the upper surface of the dock so as to be visible from 300 m (1000 ft.) above the water runway.

(b) Bull rails

Where bull rails are installed they shall be painted in alternated bands of international orange and white stripes.

(c) Gangways shall be painted red or signage provided indicating seaplane access only.

WCS-ADR-WDSN.B.120 Markings – Marker buoys

Marker buoys should be in accordance with International Maritime Organisation (IMO) standards and be visible to aircraft:

(a) manoeuvring on the surface of water; and

(b) 300 m (1000 ft.) above the water runway.

WCS-ADR-WDSN.B.125 Water runway markers

(a) Except as specified in (b) at water aerodromes where there is no conflict with marine traffic or marine regulations:

(1) Both ends of the take-off and landing area shall be marked with floating markers.

(2) The markers shall be visible from a distance greater than 2 nautical miles.

(3) Each marker shall be :

(i) of international orange in color; or

(ii) alternating international orange and white.

(b) Where it is impracticable to mark the water runway as specified in (a):

(1) guidance such as geographical points and/or other visual references shall be provided to designate the take-off and landing area; and

(2) these visual references shall be identified and published.

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WCS-ADR-WDSN.B.135 Displaced threshold markers

Where a threshold is displaced permanently or temporarily:

(a) the threshold displacement shall be marked with floating markers;

(b) the markers shall be visible from a distance of at least 2 nautical miles; and

(c) each marker shall be international orange or the markers shall be alternating international orange and white.

WCS-ADR-WDSN.B.140 Hazardous area markers

(a) Where shoals or other hazards could endanger a seaplane, marker buoys shall be installed to clearly indicate the hazardous area.

(b) Marker buoys for delineating hazardous area shall be distinctly marked from water runway markers in colour and shapes.

WCS-ADR-WDSN.B.145 Prohibition sign

(a) A sign shall be provided and displayed on the dock restricting the dock to seaplane operations only.

(b) a sign shall be displayed on the dock restricting passengers from the docking area until all seaplanes and propellers have come to a complete stop.

WCS-ADR-WDSN.B.150 Strobe lights

Strobe lights should be provided to delineate water aerodrome facilities wherever necessary.

Where installed, the strobe lights shall be:

(a) white, quick flashing; and

(b) located in an area that is easily and constantly seen by both marine and air traffic.

WCS-ADR-WDSN.B.160 Visual Aids to denote obstacles

(a) Fixed objects

(1) Objects that are conspicuous by their shape, size or colour need not be marked.

(2) Except as covered under the Marine Act, objects shall be marked in accordance with (b).

(b) Marking of objects

(1) Except as specified in (a) all fixed objects shall be marked in a conspicuous colour.

(2) Where it is not possible to colour the objects, markers or flags shall be displayed on or above the objects.

(c) The colour and form of marking displayed on objects shall be in accordance with CAR AGA, Part ADR.

(d) Use of markers

(1) markers displayed on or adjacent to objects shall be:

(i) located in conspicuous positions so as to retain the general definition of the object; and

(ii) recognizable in clear weather from a distance of:

- 1000 m for an object to be viewed from the air; and
- 300 m for an object to be viewed from the ground in all directions in which a seaplane is likely to approach the object.

(2) The shape of the markers shall be:

(i) distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information; and

(ii) such that the hazard presented by the object they mark is not increased.

(3) The colour selected shall contrast with the background against which it will be seen.

WCS-ADR-WDSN.B.170 Visual Aids

(a) Water aerodrome identification and maneuvering area lighting should be provided for reduced visibility conditions wherever necessary.

(b) A lighted water aerodrome can be identified by a beacon alternating white and yellow flashes at the rate of 12 to 30 flashes per minute.

(c) In water traffic congested areas, a radio activated strobe beacon may be used to alert mariners and other airman that a seaplane will be arriving or departing within a short time.

(d) Floodlights or spotlights should be installed on the shore to illuminate aprons, floats, ramps, and piers wherever necessary. Care must be taken in locating and aiming floodlights to preclude affecting the vision of pilot's landing or taking off or creating distracting reflections.

PART TRAINING (TRG)

SUBPART – ORGANISATIONAL REQUIREMENTS (TRG.OR)

SECTION A – PROVISION OF TRAINING SERVICES AND/OR ACTIVITIES

TRG.OR.A.005 PROVISION OF TRAINING SERVICES AND/OR ACTIVITIES

(a) The training services and/or activities stated under this SUBPART shall be provided to all personnel by the aerodrome operator, either directly or indirectly.

(b) Where the training services and/or activities contained in this SUBPART are provided by a third party either fully or partially, aerodrome operator shall establish and implement safety oversight of the provisions, in accordance with the aerodrome operator's safety management system, to ensure compliance with the requirements contained in this Regulation.

GM1 TRG.OR.A.005 Provision of training services and/or activities

Provision of training services and/or activities

(a) Unless otherwise specified, the generic term "aerodrome" refers to both aerodrome and vertical flight infrastructure (i.e., heliport, helideck and vertiport).

(b) The training services and/or activities contained in this SUBPART need to be provided at an aerodrome. In some cases, these training services and/or activities are not directly provided by the operator, but by a third-party organisation or combination of both. However, the operator, being responsible for the operation of the aerodrome should have arrangements and interfaces with the third party to ensure that these services and/or activities are provided according to the legal requirements. The method described above meets with the intention of an integrated Safety Management System that helps the operator to ensure the safety objective of the provision is being met.

AMC1 TRG.OR.A.005 Provision of training services and/or activities

Third party

(a) An aerodrome or vertical flight infrastructure operator should ensure safety oversight of a third party, as part of the operator's safety management system, at least, includes:

(1) establishing a formal agreement with the third party on the types and duration of the contracted services and/or activities;

(2) administering a committee for the planning, monitoring and evaluating the contracted services and/or activities;

(3) implementing risk management of the contracted services and/or activities;

(4) implementing performance monitoring of the contracted services and/or activities; and

(5) conducting audits and inspections of the contracted services and/or activities.

GM AMC1 TRG.OR.A.005 ESTABLISHING AND IMPLEMENTING SAFETY OVERSIGHT of third party

ESTABLISHING AND IMPLEMENTING SAFETY OVERSIGHT OF THIRD PARTY

Refer to CAR SMS for guidance on establishing and implementing safety oversight.

SECTION B – TRAINING AND PROFICIENCY CHECKS PROGRAMMES

TRG.OR.B.005 TRAINING AND PROFICIENCY CHECK PROGRAMMES

(a) Aerodrome operator shall establish and implement a training programme for personnel involved in the operation, maintenance and management of the aerodrome, to ensure their continued competence, and that they are aware of the rules and procedures relevant to operation of the aerodrome and the relationship of their functions and tasks to the aerodrome operation as a whole.

(b) The training referred to in point (a) shall:

(1) include initial, recurrent, refresher and continuation training;

(2) be appropriate to the functions and tasks for the personnel

(3) include the applicable operational procedures and requirements of the aerodrome, as well as driving when required.

(c) Aerodrome operator shall establish and implement a proficiency check programme for personnel referred to in point (a), that they have demonstrated their capabilities in the performance of their tasks, in accordance with a proficiency check programme, in order to ensure:

(1) their continued competence; and

(2) that they are aware of the rules and procedures relevant to their functions and tasks.

(d) Aerodrome operator shall ensure that:

(1) adequately qualified and experienced instructors for the provision of training and assessors for the assessments and the proficiency checks are used; and

(2) suitable facilities, means and equipment are used for the provision of the training and, where applicable, for the conduct of the proficiency checks.

(e) Aerodrome operator shall establish and implement procedures for the implementation of the training and proficiency check programmes and shall:

(1) maintain appropriate qualification, training and proficiency check records to demonstrate compliance with this requirement;

(2) upon request, make such records available to its personnel concerned.

AMC1 TRG.OR.B.005 Training and proficiency check programmes

Training of personnel — general

(a) The training programme should cover all personnel:

(1) involved in the operation, maintenance, and management of the aerodrome (supervisors, managers, senior managers, and the accountable manager); and

(2) operating unescorted on the movement area, and other operational areas of the aerodrome, and which are related to the Aerodrome operators, regardless of their level in the organisation.

(b) The training programme should include safety management system training whose level of detail should be appropriate to the individual's responsibility and involvement in the safety management system and should also include human and organisational factors.

(c) The training programme should consist of the following:

(1) a process to identify training standards, including:

(i) syllabi, duration, and frequency for each type of training and area of activity for the persons mentioned in point (a), including for the instructors and assessors;

(ii) method(s) for delivery of training and competency assessment;

(iii) minimum performance to be achieved by trainees; and

(iv) track completion of required training;

(2) a validation process that measures the effectiveness of training;

(3) initial job-specific training;

(4) practical training;

(5) recurrent training;

(6) refresher training; and

(7) continuation training.

(d) The training programme should identify training responsibilities and contain procedures:

(1) for training and competency assessment of the trainees; and

(2) to be applied in the event that personnel do not achieve or maintain the required standards.

(e) Training contents, syllabi and duration should comply with the operational requirements prescribed in PART ADR, PART ACM and PART VFI.

(f) A training file should be developed for each employee, including management, and a system should be in place to assist in identifying and tracking employee training requirements, and verifying that personnel have received the required/planned training.

(g) Information related training standards and the related syllabi and frequency, should be included in the aerodrome -related operations manual.

GM AMC1 TRG.OR.B.005 Training of personnel — general

Training of personnel — general

(a) Aerodrome personnel

(1) The purpose of the training programme is to ensure the initial and continued competence of the Aerodrome operators' personnel to perform their duties, irrespective of their level in the organisation. This is to be achieved by ensuring that each person receives initial, recurrent, and if necessary, refresher training (as a result of absence from duties), and other ad hoc training (e.g., due to the planned/implemented change to the aerodrome system, etc.), which is relevant to his or her function and tasks.

(b) One method to achieve this is by identifying the tasks of the employees and ensuring that each one of them receives the training that corresponds to such tasks.

(c) For example, an employee whose tasks involve driving would need to undergo the relevant driving training (depending on the area of the aerodrome that he or she will operate in the course of his or her duties). Moreover, if the duties of that person involve also conducting inspections of the movement area, then the training plan for that employee would also need to include relevant training for that area.

(d) Moreover, apart from this specific type of training, one would also consider the need for all personnel to undergo a safety management system training relevant to their duties.

(e) As part of the process of the development of the training programme, there are also other issues that need to be considered, such as:

(1) the content and duration of the courses;

(2) the minimum performance required by the trainees;

(3) the method to be used for the delivery of the training;

(4) the way the competency assessments of the trainees will be performed; and

(5) the development of the relevant procedures to ensure that the training programme achieves its objectives and covers circumstances that may occur (e.g., the case where an employee fails to achieve the required competency level).

AMC2 TRG.OR.B.005 Training and proficiency check programmes

Initial training

(a) Theoretical training

(1) A suitable method (or suitable methods) for the delivery of each part of the required training should be identified and specified in the training programme;

(2) The theoretical training should be delivered at appropriate training facilities, and the delivery of the training should be supported by means and equipment which are suitable for the training area covered;

(b) After the initial training, the acquired competency should be assessed. The competency assessment should be accomplished by using identified method(s), appropriate to the training element to be assessed. Assessment procedures should be established, addressing, as a minimum, location(s), identity check and invigilation, and assessment discipline. Computer-based systems may be used for the assessment of the trainees.

(c) Practical training

(1) The practical training, where applicable, should follow the successful completion of the theoretical training and should be provided by an instructor nominated in accordance with **AMC1 TRG.OR.A.005**(d);

(2) A practical competency assessment should be conducted by an assessor nominated in accordance with **AMC1 TRG.OR.A.005**(d), following the completion of each practical training provided.

GM AMC2 TRG.OR.B.005 Initial training

Initial training

Computer-based training may also be used, where interaction of the trainee(s) with other persons is not necessary and where the training material has been prepared, reviewed and updated by an instructor nominated in accordance with **AMC1 TRG.OR.A.005**(d). Where provided, such training should consider human factors principles, and, as a minimum, should also cater for the possibility for the trainees to ask questions and receive clarifications, as well as to provide feedback.

AMC3 TRG.OR.B.005 Training and proficiency check programmes

Recurrent, refresher and continuation training

(a) Recurrent training

(1) The recurrent training may be only theoretical and should cover the areas addressed in the initial theoretical training provided. The recurrent training should be designed to review, reinforce or enhance the existing knowledge and skills of the trainees, and

should also take into account the changes that have taken place in the content of the subjects covered by the initial training.

(2) Upon completion of the recurrent training, an assessment of the trainee should be conducted.

(b) Refresher training

(1) The refresher training may be only theoretical, and shorter than the recurrent training, and its content should consider the length of the person's absence and the magnitude of the relevant changes that may have taken place during the period of absence of the employee.

(2) Upon completion of the refresher training, an assessment of the trainee should be conducted.

(c) Continuation training

(1) Continuation training should be provided in the following cases:

(i) A person is assigned new/different tasks;

(ii) In the case a person is to be assigned to different/additional tasks, an appropriate theoretical and practical training which covers any differences between his or her previous and future tasks should be completed. This differences training should be determined based on a comparison between the training required for the new tasks, and the training already completed by that person, as documented in his or her training records;

(iii) The provision of training should be followed by relevant competency assessment; and

(iv) A change is introduced to the operating environment of a person, which is of such nature and/or magnitude that it requires the training of the personnel (e.g. a new system to be used by the personnel concerned).

(d) A method should be established and documented to be used for determining the need (or not) for, as well as the type(s) (theoretical, practical, or both) of, training to be provided following changes. The provision of training should be followed by a relevant competency assessment.

AMC4 TRG.OR.B.005 Training and proficiency check programmes

Proficiency checks

(a) Aerodrome operator should establish a system for ensuring that their employees maintain their competencies in those areas which they are operating.

(b) The proficiency check programme should:

(1) include a process to identify the frequency of proficiency checks, including for the instructors and assessors, and track completion of the required checks;

(2) identify checking responsibilities and relevant checking methods and procedures;

(3) include procedures to be applied in the event that personnel do not achieve the required standards; and

(4) include a validation process that measures the effectiveness of the programme.

(c) Information related to the proficiency check programme should be included in the aerodrome -related operations manual.

GM AMC4 TRG.OR.B.005 Proficiency checks

Proficiency checks

(a) The purpose of the proficiency check is to establish the ability of an individual to perform satisfactorily, in accordance with applicable requirements and the content of the aerodrome -related operations manual as they relate to his or her tasks.

(b) In particular, the proficiency checks of the Aerodrome operators' personnel should determine the performance of an individual regarding the tasks assigned to him or her.

(c) To this end, the elements that each proficiency check should be identified and documented.

(d) A proficiency check does not need to cover all associated elements at the same time; however, all elements of a proficiency check should be covered within the period as mentioned in (g) or lesser determined by the Aerodrome operators.

(e) Depending on the situation, specialty and element checked, and provided that it will not affect the quality and completeness of the proficiency check, a single proficiency check may be used to cover more than one person. The person(s) to be checked should be made aware prior to the proficiency check.

(f) The methods to be used for the checking of the trainees could include:

(1) practical demonstration;

(2) computer-based assessment;

(3) oral or written tests;

(4) or combinations of such methods, as appropriate.

(g) Unless otherwise specified in this Part and Part-ADR.OPS, PART ACM and PART VFI, Aerodrome operator should ensure that persons referred to in point **TRG.OR.B.005 (a)** - Training and proficiency check programmes, undergo proficiency checks at intervals not exceeding 24 months since the completion of their initial training.

AMC5 TRG.OR.B.005 Training and proficiency check programmes

Instructors and assessors

(a) Aerodrome operator should nominate instructors and assessors to be used for the implementation of the training and proficiency check programmes.

(b) Instructors

(1) Theoretical instructions should be given by appropriately qualified instructors. They should have:

(i) appropriate level and depth of knowledge in the field where instruction is to be given;

(ii) documented ability to use appropriate instructional techniques; and

(iii) adequate experience in the subject where instruction is to be given.

(iv) Instruction on practical skills should be given by appropriately qualified instructors who:

(A) meet the theoretical knowledge, and the working experience requirements appropriate to the instruction being given;

(B) have demonstrated the ability to instruct, and to use appropriate instructional techniques;

(C) are proficient in instructional techniques in the areas in which it is intended to provide instruction; and

(D) receive relevant training, in accordance with the training programme, to ensure that the instructional competencies are maintained.

(c) Assessors

(1) The persons who are responsible for assessing the competence of the personnel should:

(i) have demonstrated the ability to assess the performance of, and conduct tests and checks in the areas covered by the training;

(ii) receive relevant training, in accordance with the training programme, to ensure that the assessment standards are maintained up to date; and

(iii) meet the theoretical knowledge requirements appropriate to the instruction being given and have adequate working experience in the area of instruction.

AMC6 TRG.OR.B.005 Training and proficiency check programmes

Personnel records

(a) Aerodrome operator should use its record keeping system to record the following information for each person:

(1) starting date of employment/ending date of employment (if applicable);

(2) area of activity;

(3) previous working experience;

(4) qualifications;

(5) training (before entry and subsequent); and

(6) proficiency checks;

(b) Latest changes should be reflected into personnel records.

AMC7 TRG.OR.B.005 Training and proficiency check programmes

Training records

(a) Training programme — General

(1) The records of the training sessions provided, should include as a minimum the following:

(i) type of training, area of training and subjects covered;

(ii) names of delegates/signed list of delegates;

(iii) date and duration of training; and

(iv) names of the instructor and assessor.

(b) Training records of individuals

(1) The training records maintained for each individual should include as a minimum:

(i) the name of the trainee;

(ii) the date(s) and the duration of the training;

(iii) the place where the training was received;

(iv) the subjects covered, and the methodology of the course;

(v) the performance assessment of the trainee, as applicable; and

(vi) the name and signature of the instructor and assessor.

AMC8 TRG.OR.B.005 Training and proficiency check programmes

Proficiency check records

(a) The proficiency check records for each individual should include as a minimum:

(1) the name of the person checked;

(2) the date(s) and the duration of the proficiency check;

(3) the methodology of the check conducted;

(4) any comments made by the assessor;

(5) the performance evaluation of the person checked; and

(6) the name and signature of the assessor.

GM AMC8 TRG.OR.B.005 Proficiency check records

Proficiency check records

Proficiency checks may be conducted at shorter intervals following, for example, an occurrence or to ensure that the person is able to apply in practice knowledge acquired due to updated training.

SECTION C – AIRSIDE DRIVING PERSONNEL

TRG.OR.C.005 AIRSIDE DRIVING PERSONNEL — TRAINING

Aerodrome operator shall establish and implement training and proficiency checks programmes for airside vehicle drivers at the aerodrome.

AMC1 TRG.OR.C.005 Airside driving personnel — training

Training of drivers — general

(a) Aerodrome operator should ensure that all airside drivers have successfully completed theoretical and practical training of adequate duration, at least in the following areas:

(1) regulatory framework and personal responsibilities;

(2) vehicle standards, aerodrome operational requirements and procedures;

(3) safety of operating vehicles and equipment on the airside

(4) communications and radiotelephony, for drivers that operate in the manoeuvring area;

(5) human performance limitations;

(6) aerodrome layout and familiarisation with the operating environment;

(7) aerodrome rules including right of way and emergency procedures;

(8) aerodrome marking, signs and lighting.

(b) The training programme that drivers need to follow should depend on the areas where they need to be operating. The following two training programmes should be developed:

(1) General driving training programme

This training should cover the needs of all drivers operating on the apron area and other operational areas of the aerodrome. The successful completion of this training grants a driver the authorisation to operate unescorted, a vehicle on aprons and other operational areas of the aerodrome, except on the manoeuvring area.

(2) Manoeuvring area training programme

This training should cover the additional specific needs of the drivers who will be operating on the manoeuvring area. A driver is granted the authorisation to operate unescorted on the manoeuvring area subject to the:

(i) provisions of **ADR.OPS. B.024(a)(4)- Language proficiency**;

(ii) successful completion of the general driving training programme; and

(iii) successful completion of the manoeuvring area training programme.

(c) Each of the above-mentioned training programmes (general driving training programme and manoeuvring area training programme) should consist of the following parts:

(1) Theoretical training

The theoretical training should be of a defined and adequate duration, supported by suitable educational means and material.

The theoretical training should be followed by an assessment of the trainees (see **AMC1 ADR.OR.D.017(e)**). Once the theoretical part has been successfully completed, the driver should undertake practical training.

(2) Practical training

During the phase of the practical training, which needs to be of a defined and adequate duration, the trainees should be provided with adequate practical training and familiarisation with the aerodrome facilities and its procedures by the nominated instructors, in day and, if relevant, night conditions.

Following the delivery of the practical training, the competence of the trainees should be assessed, in practical terms, by the nominated assessors (see AMC1 ADR.OR.D.017(e)). This assessment should aim at assessing the ability of the trainees to apply, in practice, the knowledge and skills they have acquired through the theoretical and practical training.

(3) Upon the successful completion of the practical training, and provided that the driver has received training on the use of a vehicle (see AMC1 ADR.OPS. B.024(a)(5)), a driving authorisation may be issued.

(d) Instructors and assessors should be suitably qualified and competent.

(e) The aerodrome operator should conduct continuous oversight of the content and quality of the training.

(f) Where the responsibility for vehicle driver training (apron and manoeuvring area) and RTF training is delegated to a third-party provider, the aerodrome operator should institute an oversight programme as part of its safety management system to ensure that agreed standards are being maintained.

(g) Aerodrome operator should regularly review their vehicle driver training programmes.

GM1 AMC1 TRG.OR.C.005 Training of drivers — general

Training of drivers — general

(a) Generally, operations at an aerodrome are dependent on air traffic controllers, pilots and vehicle drivers using visual observations to estimate the respective relative position of aircraft and vehicles. Pilots and vehicle drivers rely on visual aids (lighting, markings and signage) to

guide them along their assigned routes and to identify intersections and holding positions. As part of the Surface Movement Guidance and Control System (SMGCS) the aerodrome operator should establish and train aerodrome users on the characteristics and meaning of the standardized markings and signage implemented at the aerodrome. These should include, but are not limited to:

(1) Markings

(i) Boundary of responsibility line

(ii) Stand safety line

(iii) Stand-by areas – restricted for aircraft manoeuvres

(iv) Stand-by areas – height restricted

(v) Stand divide line

(vi) Tractor pushback line and pushback limit line

(vii) Equipment staging area

(viii) Air bridge wheel position

(ix) Underground services including fuel hydrant markings

(x) Service road

(xi) Vehicle limit line

(xii) Stand identification on service road

(xiii) Taxiway and taxi lane crossing

(xiv) Pedestrian crossing

(xv) Pedestrian guide line

(2) Apron Signs

(i) Stand identification sign for aircraft

(ii) No-entry sign for aircraft

(iii) Sign attention to crossing aircraft for vehicles

(iv) Jet blast sign for vehicles

(v) Examples of road and other traffic signs

(vi) Examples of emergency signs

(vii) FOD Bin

(b) The theoretical training should be supported by material which provides up-to-date, adequate and suitable information regarding the aerodrome, in the form of presentations, maps, diagrams, videos, booklets, checklists, etc. as appropriate

GM2 AMC1 TRG.OR.C.005 Recurrent, refresher and continuation training

Recurrent, refresher and continuation training

TRG.OR.B.005 Training and proficiency check programmes regulates the provision of training following the completion of the initial training, as part of the aerodrome operator's training programme.

AMC2 TRG.OR.C.005 Airside driving personnel — training

Training for airside driving permit training providers

The following elements should be considered when developing training programs and knowledge requirements for all categories of airside vehicle drivers:

(a) Airside Driving Permit (ADP)

(1) the issuing authority, the validity of the permit in terms of time, conditions of use, and its transferability;

(2) ownership of the permit and control, and audit of permit issue;

(3) local enforcement, and driving offence procedures; and

(4) relationship to UAE driver licensing system.

(b) National legislation and regulation

(1) UAE regulations related to general vehicle driving licenses;

(2) Local transport authority requirements; and

(3) GCAA requirements/guidance for driving airside.

(c) Aerodrome regulations and requirements

(1) ATC procedures that are applicable for vehicles;

(2) the definition of movement areas, manoeuvring areas, aprons and stands;

(3) specific aerodrome regulations, requirements, and local instructions;

(4) local methods used to disseminate general information, and instructions to drivers; and

(5) local methods used to disseminate information regarding works in progress.

(d) Personal responsibilities

(1) agreed aerodrome requirements concerning fitness to drive (medical and health standards);

(2) issue and use of personal protective equipment, such as high visibility clothing and hearing protection;

(3) general driving standards;

(4) no-smoking/no-alcohol, use of psychoactive substances and medicines requirements airside;

(5) responsibilities with respect to foreign object debris and fuel/oil spillage; and

(6) the responsibility to ensure that a vehicle is suitable for the task, and is used correctly;

(7) Implementation of 'sterile-cab' concept, avoiding disturbing and distracting activities while driving;

(8) requirements concerning fitness to drive (medical standards);

(9) responsibilities with respect safety reporting; and

(10) responsibilities with respect to escorting other vehicles (applicable for manoeuvring area.

(e) Vehicle standards

(1) condition and maintenance standards – fit for purpose and task;

(2) requirements for daily inspection and inspection prior to operating on the manoeuvring area;

(3) the requirement to display obstacle lights and company insignia;

(4) the requirement for, and content of, daily vehicle inspections;

(5) agreed standards of aerodrome and company vehicle fault reporting and rectification; and

(6) requirements for the issue and display of airside vehicle permits.

(7) serviceability of all essential communication systems with air traffic services and base operations.

(f) General aerodrome layout

(1) the geography of the aerodrome;

(2) aviation terminology used such as runway, taxiway, apron, roads, crossings, runway-holding points;

(3) all aerodrome signs, markings and lighting for vehicles and aircraft; particular emphasis on signs, markings and lighting used on the manoeuvring area and used to protect the runway;

(4) specific reference to signs, markings and lighting used to guard runways, and critical areas;

(5) specific reference to any controlled/uncontrolled taxiway crossing procedures;

(g) Airside traffic rules

(1) general rules;

(2) local rules;

(3) rules for operating in low visibility;

(4) speed limits, prohibited areas and no parking regulations;

(5) right of way of aircraft, towed aircraft, and rescue and fire fighting vehicles in an emergency;

(6) reversing procedure.

(h) Hazards of general airside driving

(1) the danger zones around aircraft;

(2) taxiway / taxi lane crossings;

(3) engine suction/ingestion and jet blast, propellers and helicopters;

(4) aircraft refuelling;

(5) foreign object debris and spillages;

(6) vehicle reversing;

(7) staff and passengers walking across aprons;

(8) air bridges and other services such as fixed electrical ground power;

(9) the general aircraft turnaround process;

(10) aircraft emergency stop and fuel cut-off procedures;

(11) hazardous cargo;

(12) local vehicle towing requirements;

(13) requirements for driving at night;

(14) requirements for driving in adverse weather conditions, particularly low visibility;

(15) procedures in the event of a vehicle or radio becoming unserviceable while on the manoeuvring area.

(i) Security procedures

(1) personal requirements (identification cards) and exemptions where applicable;

(2) vehicle security permits;

(3) security restricted areas;

(4) security critical areas.

(j) Penalties for non-compliance

(1) Human performance, including:

(2) basic concepts of human factors;

(3) basic aviation psychology, including:

(i) attention and vigilance;

(ii) perception;

(iii) memory;

(iv) human error;

(v) decision-making;

(vi) avoiding and managing errors;

(vii) human behavior.

(k) Local organisations

(1) the role of the aerodrome operator in setting and maintaining standards;

(2) the GCAA and its responsibilities;

(3) the national and/or local police, and their involvement with airside driving;

(4) other enforcement authorities dealing with vehicles, driving, health, and safety.

(5) the role of the local ATS unit.

(l) Emergency procedures

(1) actions and responsibilities in a crisis situation (any accident or significant incident occurring on the aerodrome);

(2) action in the event of a vehicle accident, in the event of a vehicle striking an aircraft, FOD events;

(3) action in the event of fire;

(4) procedures to be used by vehicle drivers if lost or unsure of their position;

(5) action in the event of an aircraft accident/incident;

(6) action in the event of personal injury;

(7) emergency telephone numbers.

(m) Communications

(1) radio procedures and phraseologies to be used if applicable;

(2) light signals used by ATC;

(3) procedures to be used by vehicle drivers if lost or unsure of position;

(4) local emergency telephone numbers; and

(5) how to contact the local aerodrome safety unit.

(n) Practical training (visual familiarisation)

(1) airside service roads, taxiway crossings, and any restrictions during low visibility;

(2) aprons and stands- boundary of responsibility line , stand safety lines

(3) surface paint markings for vehicles and aircraft;

(4) surface paint markings that delineate the boundary between aprons and taxiways;

(5) parking areas and restrictions;

(6) pushback line , pushback limit lines

(7) vehicle limit lines;

(8) pedestrian crossing;

(9) equipment staging area;

(10) airbridge wheel positions;

(11) underground services, including fuel hydrant markings;

(12) FOD bins;

(13) jet blast caution signs

(14) emergency signs;

(15) speed limits and regulations; and

(16) hazards during aircraft turnarounds and aircraft movements.

AMC3 TRG.OR.C.005 Airside driving personnel — training

Manoeuvring area vehicle driver — trainings

In addition to the training requirements listed in **AMC1 ADR.OPS.B.024(c) Authorisation of airside vehicle drivers** , drivers who are expected to operate on the manoeuvring area of the aerodrome should also receive training in the following areas. Any driver expected to drive on the manoeuvring area should also obtain an agreed period of experience in general airside driving before undertaking this training.

(a) Air traffic control

(1) the aerodrome control function and area of responsibility;

(2) the ground movement control function and area of responsibility;

(3) normal and emergency procedures used by ATC relating to aircraft;

(4) ATC frequencies used and normal handover/transfer points for vehicles;

(5) ATC call signs, vehicle call signs, phonetic alphabet, and standard phraseology; and

(6) demarcation of responsibilities between ATC and apron control if applicable.

(b) Aerodrome layout

(1) description of equipment essential to air navigation such as instrument landing systems (ILS);

(2) description of protected zones related to ILS antenna;

(3) description of ILS protected areas, and their relation to runway-holding points;

(4) description of runway instrument/visual strip, cleared and graded area; and

(5) description of lighting used on the manoeuvring area with particular emphasis on those related to low visibility operations.

(c) Aircraft familiarisation

(1) knowledge of aircraft types and ability to identify all types normally operating at the aerodrome;

(2) knowledge of airline call signs; and

(3) knowledge of aircraft terminology relating to engines, fuselage, control surfaces, undercarriage, lights, vents, etc.

(d) Practical training (visual familiarisation)

(1) all runways (including access and exit routes), holding areas, taxiways and aprons;

(2) all signs, surface markings and lighting associated with runways, holding positions, CAT I, II, and III operations;

(3) all signs, surface markings and lighting associated with taxiways;

(4) specific markings that demarcate the boundary between aprons and manoeuvring areas;

(5) navigation aids such as ILS, protected area, antenna, RVR equipment, and other meteorological equipment;

(6) hazards of operating around aircraft landing, taking off or taxiing; and

(7) any locally used naming convention for particular areas or routes.

AMC4 TRG.OR.C.005 Airside driving personnel — training

Training of drivers — radiotelephony

In addition to the training requirements listed in **AMC1 ADR.OPS.B.024(c)** and **AMC2 ADR.OPS.B.024(c) Authorisation of airside vehicle drivers** , drivers who are expected to operate on the manoeuvring area of the aerodrome should also receive training in Radiotelephony , which should include as a minimum:

(a) hierarchy of message priority: message priorities, and understanding of distress, alerting, control and information messages.

(b) phonetic alphabet: correct pronunciation of letters, words, and numbers.

(c) standard phraseology

(1) emphasis on the need for drivers to use standard phraseology; and

(2) the need for caution with certain phrases such as ‘cleared’.

(d) call signs for aircraft, ATC, and vehicles

(1) an understanding of terminology and acronyms used by ATC and pilots;

(2) knowledge of the airline call signs used at the aerodrome; and

(3) knowledge of vehicle call signs, and that they should be appropriate to their function.

(e) read back procedures: The need for vehicle drivers to use standard readback, in the same manner as pilots, for instructions such as ‘enter/cross the runway’, and if conditional clearances are used.

(f) readability scale: Understanding and use of the readability scale from 1 to 5.

(g) lost or uncertain of position: Understanding of local procedures for vehicle drivers are lost or uncertain of their position on the manoeuvring area.

(h) vehicle breakdown

(1) local procedure for vehicle breakdown on runways and taxiways; and

(2) procedure for notifying ATC of vehicle failure.

(i) radio failure

(1) understanding of the local procedure if radio failure occurs while on the runway or taxiway; and

(2) understanding of the light signals that can be used by ATC to pass instructions to vehicles.

(j) transmitting techniques and use of RTF

(1) understanding the reasons for listening out prior to transmitting;

(2) use of standard phraseology and ICAO air-ground radiotelephony communications procedures;

(3) words and sounds to be avoided;

(4) correct positioning of microphones to avoid voice distortion;

(5) avoidance of ‘clipped’ transmissions;

(6) awareness of regional accents and variations of speech; and

(7) speed of delivery of RTF phraseology.

(k) portable radios

(1) correct use of radios;

(2) effective range and battery life;

(3) screening/shielding effects on the aerodrome; and

(4) use of correct call signs, either related to a vehicle or a person.

(l) safety while using radios

(1) local instructions regarding the use of portable radios and hand-held microphones while driving a vehicle; and

(2) local instructions on the use of mobile telephones while operating airside.

AMC5 TRG.OR.C.005 Airside driving personnel — training

THEORITICAL TRAINING — RADIO TELEPHONY

(a) All drivers of vehicles operating on the manoeuvring area should have an appropriate level of competence with respect to the use of RTF phraseology.

(b) The theoretical training should emphasise on the following areas:

(1) categories of messages

(i) message categories and priorities; an understanding of distress, alerting; and

(ii) control and information messages.

(2) test procedures including readability scale

(i) understanding and use of the readability scale from 1 to 5.

PRACTICAL TRAINING — RADIO TELEPHONY

In this phase, the training should cover the use of fixed and portable radio communication devices, and the practical use of the theoretical knowledge acquired in the previous phase of the training, through the implementation of the aerodrome's communication procedures.

SECTION D – AERODROME RESCUE AND FIREFIGHTING PERSONNEL

TRG.OR.D.005 AERODROME RESCUE AND FIREFIGHTING PERSONNEL — TRAINING

(a) An aerodrome operator, except vertical flight infrastructure, shall:

(1) establish and implement training and proficiency check programmes for rescue and firefighting personnel including training in human performance and team coordination; and

(2) obtain GCAA acceptance for training and proficiency check programmes for rescue and firefighting personnel including initial and subsequent changes to the programmes.

AMC1 TRG.OR.D.005 Aerodrome rescue and firefighting personnel — training

Training and proficiency check programmes arrangements

(a) A competent person should be formally appointed with the authority and responsibility for establishing, implementing and maintaining training and proficiency check programmes for aerodrome rescue and firefighting personnel at the aerodrome.

(b) A training standardisation and development committee should be established to:

(1) ensure consistency of assessment decisions and associated records;

(2) provide continuous improvement of the overall training and proficiency check programmes;

(3) review and implement changes to requirements as appropriate; and

(4) consider the learning that arises from aircraft accidents or other similar events.

GM1 AMC1 TRG.OR.D.005 ARFFS training competent person

1. Definition of Competent Person

(a) A Competent Person is defined as an individual who possesses the requisite qualifications, knowledge, experience, and authority to manage and oversee the training and proficiency of ARFFS personnel. This person is formally appointed by the aerodrome operator and is responsible for establishing, implementing, and maintaining training and proficiency check programmes to ensure compliance with regulatory and operational requirements.

2. Qualifications and Experience

(a) The competent person should have the following qualifications and experience:

(1) A recognised qualification in ARFFS management, emergency management, or a related field.

(2) A minimum of five years of experience in a supervisory or managerial role within an ARFFS or equivalent emergency services environment.

(3) Demonstrated experience in the development and delivery of training programmes and proficiency assessments, including a thorough understanding of adult learning principles and assessment methodologies.

(4) In-depth knowledge of relevant GCAA, ICAO standards, national regulations, and industry best practices related to ARFFS operations and training.

3. Authority and Responsibility

(a) The competent person should have the authority to:

(1) Establish and implement training programmes for all ARFFS personnel, including initial, recurrent, and specialised training.

(2) Develop and administer proficiency check programmes to ensure that personnel maintain the required level of competency.

(3) Authorise and conduct assessments, evaluations, and acceptance of ARFFS personnel's performance.

(4) Monitor and evaluate the effectiveness of training programmes and make necessary adjustments to improve training outcomes and operational readiness.

(5) Report to senior management and the regulatory authority on the status and effectiveness of training and proficiency check programmes.

4. Appointment of the Competent Person

(a) The aerodrome operator should formally appoint the competent person through an official appointment letter, specifying the authority, responsibilities, and accountability of the role. This appointment should be recorded in the aerodrome's official documents and communicated to all relevant stakeholders, including the regulatory authority.

(b) The competent person's appointment, qualifications, and experience should be documented and maintained in the aerodrome's personnel records. These records should be readily available for inspection by the regulatory authority upon request.

5. Responsibilities of the Competent Person

(a) The competent person is responsible for the following key functions:

(1) Initial Training: Develop comprehensive training programmes for new ARFFS personnel, covering all core competencies, including fire suppression, rescue operations, emergency medical response, and operational procedures.

(2) Recurrent Training: Ensure ongoing training for all ARFFS personnel to maintain and update skills and knowledge, in line with changing operational requirements and regulatory standards.

(3) Specialised Training: Implement specialised training for specific operational roles or equipment, such as breathing apparatus operations, hazardous materials response, and incident command.

(b) Implementing Proficiency Check Programmes

(1) Annual Proficiency Checks: Develop and administer annual proficiency checks for all ARFFS personnel to verify their ability to perform required tasks and responsibilities.

(2) Scenario-Based Assessments: Conduct scenario-based assessments to evaluate personnel's performance under realistic and challenging conditions.

(3) Remedial Training: Identify areas of deficiency during proficiency checks and implement remedial training to address gaps in knowledge or skills.

(c) Maintaining Training Records

(1) Training Logs: Maintain accurate and up-to-date training logs for all ARFFS personnel, documenting training activities, proficiency checks, and acceptances.

(2) Assessment Records: Keep detailed records of all assessments and proficiency checks, including performance evaluations and any corrective actions taken.

(d) Continuous Improvement

(1) Programme Review: Regularly review and update training and proficiency check programmes to reflect changes in regulations, industry standards, and operational needs.

(2) Feedback Mechanism: Establish a feedback mechanism to collect input from ARFFS personnel and use this information to improve training and assessment processes.

(e) Compliance Monitoring

(1) The competent person should ensure that all training and proficiency check programmes comply with GCAA standards, national regulations, and any additional requirements set by the aerodrome operator.

GM2 AMC1 TRG.OR.D.005 ARFFS training standardisation and development committee

ARFFS training standardisation and development committee

1. Purpose and Scope

(a) The purpose of the training standardisation and development committee (TSDC) is to:

(1) Ensure Consistency of Assessment Decisions: Maintain uniformity in the evaluation of ARFFS personnel's performance and the associated documentation.

(2) Continuous Improvement of Training Programmes: Enhance the quality and effectiveness of training programmes through regular review and updates.

(3) Implement Changes to Requirements: Monitor and adapt training programmes and requirements in response to regulatory updates, industry best practices, and operational needs.

(4) Learning from Aircraft Accidents and Similar Events: Analyse and integrate lessons learned from incidents, accidents, and other significant events to improve training and operational readiness.

(b) The scope of this guidance applies to all aerodromes within the regulatory jurisdiction and is intended for use by aerodrome operator, ARFFS training managers, and training providers overseeing ARFFS training standards.

2. Establishment of the Training Standardisation and Development Committee (TSDC)

(a) The TSDC should consist of a diverse group of stakeholders, including but not limited to:

(1) Chief Fire Officer: Chairperson responsible for coordinating committee activities.

(2) Training Manager: acts as the secretariat to the committee

(3) Senior ARFFS Personnel: Experienced members who can provide insight into operational challenges and training needs.

(4) Training Instructors and Assessors: Individuals directly involved in delivering and assessing training programmes.

(5) Safety and Compliance Officer: Ensures alignment with regulatory requirements and safety standards.

(6) Human Resources Representative: Supports the integration of training outcomes with personnel development and competency frameworks.

(7) External Experts: As needed, individuals with specialised knowledge in training, safety, or emergency response.

(b) Roles and Responsibilities of the TSDC include the following key functions:

(1) Develop and implement standardised assessment tools and criteria to ensure uniformity in evaluating ARFFS personnel.

(2) Conduct regular calibration sessions for assessors to align their understanding and application of assessment standards.

(3) Review assessment records to verify the consistency and accuracy of evaluation decisions.

(4) Conduct periodic reviews of training programmes to identify areas for enhancement and update content based on feedback and emerging trends.

(5) Analyse training outcomes and assessment data to identify gaps and opportunities for improvement.

(6) Implement revised training methodologies and resources to address identified needs and improve training effectiveness.

(7) Monitor changes in regulatory requirements, industry standards, and operational needs that impact ARFFS training.

(8) Develop and recommend modifications to training programmes and requirements to ensure compliance and relevance.

(9) Communicate and implement approved changes within the training framework and ensure that all stakeholders are informed and trained accordingly.

(10) Review reports and findings from aircraft accidents, incidents, and other significant events to identify lessons relevant to ARFFS training.

(11) Develop training modules or updates that incorporate these lessons to improve preparedness and response capabilities.

(12) Facilitate scenario-based training and simulations that reflect real-world events to reinforce learning and enhance operational readiness.

3. Committee Operations

(a) The TSDC should meet at least bi-annually to review training outcomes, discuss emerging issues, and plan future activities.

(b) Additional meetings may be convened as necessary in response to significant events, regulatory changes, or urgent training needs.

(c) Agendas and minutes of meetings should be documented and retained for audit and review purposes.

(d) Decisions within the TSDC should be made by consensus wherever possible. If consensus cannot be reached, decisions will be made by a majority vote of committee members.

(e) Any proposed changes to training programmes or assessment criteria should be documented, reviewed, and approved by the committee before implementation.

(f) The TSDC is responsible for producing regular reports on its activities, including recommendations for changes to training programmes, assessment findings, and continuous improvement initiatives.

(g) All records of committee meetings, decisions, and actions should be maintained in a secure and accessible format for review by regulatory authorities and senior management.

4. Implementation and Communication

(a) Approved changes to training programmes or assessment processes should be implemented in a structured manner, with clear timelines and responsibilities assigned.

(b) Training instructors, assessors, and ARFFS personnel should be informed of changes through formal communication channels, and additional training or briefings should be provided as needed.

(c) The TSDC should maintain open communication with all stakeholders, including ARFFS personnel, management, and regulatory authorities, to ensure transparency and collaboration in the development and implementation of training initiatives.

(d) Feedback from stakeholders should be actively sought and considered in the committee's ongoing review and development activities.

5. Evaluation and Review

(a) The TSDC should conduct an annual review of its activities, including an evaluation of the effectiveness of implemented changes and the overall impact on training and operational performance.

(b) This review should include an assessment of the committee's processes, the relevance of training content, and the quality of assessment decisions.

(c) Based on the findings of the annual review, the TSDC should identify areas for improvement and develop an action plan to address these areas.

(d) The committee should remain proactive in identifying and responding to emerging challenges and opportunities within ARFFS training and development.

6. Compliance and Accountability

(a) The TSDC should ensure that all training programmes and assessment processes comply with applicable GCAA standards, national regulations, and industry best practices.

(b) Regular audits and inspections should be conducted to verify compliance and address any identified issues promptly.

(c) The TSDC is accountable to the aerodrome operator and the regulatory authority for ensuring the integrity and effectiveness of ARFFS training and assessment.

(d) Any issues or concerns regarding the committee's activities or decisions should be reported to the appropriate authority for resolution.

AMC2 TRG.OR.D.005 Aerodrome rescue and firefighting personnel — training

Establishing and implementing training and proficiency check programmes

(a) Suitable training facilities, resources and equipment should be provided to aerodrome rescue and firefighting personnel including availability of instructors and assessors for the implementation of the training and proficiency check programmes.

(b) Aerodrome rescue and firefighting personnel should actively participate in live firefighting drills commensurate with the types of aircraft, types of vehicles, vessels and equipment, and types of principal and complementary extinguishing agents in use at the aerodrome, including pressure-fed fuel fires.

(c) Training and proficiency check programmes for aerodrome rescue and firefighting personnel should include training in human performance, including team coordination.

(d) Training and proficiency check programmes for aerodrome rescue and firefighting personnel should include competency-based training and assessment programme consisting of:

(1) a structured learning programme (SLP) is established for initial acquisition of knowledge, skills and understanding;

(2) a maintenance of competence (MOC) plan is implemented for maintaining the necessary knowledge, skills and assess competency not exceeding four years; and

(3) proficiency checks (PFC) are conducted at intervals not exceeding 12 months since the completion of the initial training.

(e) Training and proficiency check programmes for aerodrome rescue and firefighting personnel mentioned in (e) should be submitted to the GCAA for acceptance, at least 90 days prior to its initial implementation including subsequent changes to the programmes henceforth.

GM1 AMC2 TRG.OR.D.005 Establishing and implementing competence-based training and assessment programmes

Establishing and implementing competence-based training and assessment programmes

A. Aerodrome RFFS competence standards

(a) This guidance outlines the requirements for an aerodrome operator to establish, implement and maintain training and proficiency checks programmes for aerodrome rescue and firefighting personnel employed at aerodrome in the United Arab Emirates, which include:

(1) a structured learning programme (SLP) for RFF personnel to achieve an initial acquisition of knowledge, skill, and understanding (KSU) in a particular set of tasks according to their assigned roles and responsibilities as operational, supervisory and managerial personnel;

(2) a maintenance of competence (MOC) plan for RFF personnel to maintain the acquired knowledge, skill and understanding (KSU) in accordance with their assigned roles and responsibilities not exceeding four years; and

(3) proficiency checks (PFC) conducted at intervals not exceeding 12 months since the completion of the structured learning programme.

B. ESTABLISHING AND IMPLEMENTING COMPETENCE-BASED TRAINING AND ASSESMENT FRAMEWORK FOR ARFFS PERSONNEL AT AERODROME S.

1. INTRODUCTION

(a) The principal objective of an aerodrome rescue and firefighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The RFF service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The most important factors bearing on effective rescue in a survivable aircraft accident is:

(1) the training received;

(2) the effectiveness of the equipment; and

(3) the speed with which personnel and equipment, designated for RFF purposes, can be deployed.

(b) Personnel whose duties consist solely of the provision of RFF services for aircraft operations are infrequently called upon to face a serious situation involving lifesaving at a major aircraft fire. They will experience a few incidents and a larger number of standbys to cover movements of aircraft in circumstances where the possibility of an accident may reasonably be anticipated but will seldom be called upon to put their knowledge and experience to the test. It follows, therefore, that only by means of a most carefully planned and rigorously followed programme of training can there be any assurance that both personnel and equipment will be capable in dealing with a major aircraft fire should the necessity arise.

2. DESIGNING COMPETENCY-BASED APPROACH TO TRAINING AND ASSESSMENT PROGRAMME

(a) The development of competency-based training and assessment is based on ICAO instructional system design (ISD) methodology approach whereby competencies and their standards are defined, training is based on the competencies identified, and assessments are developed to determine whether these competencies have been achieved.

(b) Competency-based approaches to training and assessment should include at least the following features:

(1) the justification of a training need through a systematic analysis and the identification of indicators for evaluation;

(2) the use of a job and task analysis to determine performance standards, the conditions under which the job is carried out, the criticality of tasks, and the inventory of knowledge, skills and attitudes;

(3) the identification of the characteristics of the trainee population;

(4) the derivation of training objectives from the task analysis and their formulation in an observable and measurable fashion;

(5) the development of criterion-referenced, valid, reliable and performance-oriented tests;

(6) the development of a curriculum based on adult learning principles and with a view to achieving an optimal path to the attainment of competencies;

(7) the development of material-dependent training; and

(8) the use of a continuous evaluation process to ensure the effectiveness of training and its relevance to line operations.

Note. — A detailed description of the ICAO course development methodology, a competency-based approach to training and assessment and an example of an ISD methodology is provided in the attachment to ICAO Doc 9868 Chapter 2.

(c) A training provider should develop general requirements concerning the management of instructors, assessors and provide guidance on:

(1) the selection of instructors, assessors and description of competency-based assessment training;

(2) the performance criteria to be considered by assessors when assessing each competency; and

(3) the tolerances applicable to all competency-based tests.

<u>The Competency Framework</u>

(d) The competency framework consists of competency units, competency elements, performance criteria, evidence and assessment guide and range of variables. Competency units, competency elements and performance criteria are derived from job and task analysis and are describe observable outcomes.

The ICAO Course Development Methodology

(e) The ICAO course development methodology, like any other ISD methodology, uses a systematic approach to training development. It therefore constitutes a quality assurance tool for accepted training providers that supports compliance with requirements and the development of appropriate training activities. It does so by identifying the key competencies that need to be achieved, determining the most effective way of achieving them and establishing valid and reliable assessment tools to evaluate their achievement.

(f) Such a tool, however, cannot be effectively implemented without the support of all stakeholders. Stakeholders include personnel involved in management, instruction design, instruction delivery, instruction assessment, operations and, of course, trainees. Successful implementation of competency-based training and assessment depends to a large extent on the support of this systematic approach at all levels of a training provider.

(g) The ICAO course development methodology has three broad categories — analysis, design and production, and evaluation — which can be subdivided into nine phases. A brief description of the specific outputs of the nine phases is summarized in Table-1 and a more detailed description of each phase's process is provided below.

Table-80: ICAO course development methodology

Category	Phases	Outputs
Analysis	Phase 1 — Preliminary analysis	Training proposals, their justification and proposed course of action
	Phase 2 — Job analysis	Task description and performance standards
	Phase 3 — Population analysis	Trainees' characteristics and their existing skills and knowledge
Design and production	Phase 4 — Design of curriculum	Training objectives, mastery tests and sequence of modules
	Phase 5 — Design of modules	Mode of delivery, training techniques and media, draft training material
	Phase 6 — Production and developmental testing	Production of all trainee materials
Evaluation	Phase 7 — Validation and revision	Try-out of course and revision as required

	Phase 8 — Implementation	Human resources trained
	Phase 9 — Post-training evaluation	Evaluation of training effectiveness; plans for remedial action

Note. — For a more detailed description of each phase's process refer to ICAO Doc 9868 Attachment to Chapter 2 AN EXAMPLE OF AN ISD METHODOLOGY: THE ICAO COURSE DEVELOPMENT METHODOLOGY

3. COURSE DEVELOPERS, ASSESSORS AND INSTRUCTORS

Course Developer Qualifications

(a) Course developers should have demonstrated that they possess the competencies described in this guidance and that they have successfully achieved the ability to develop training in accordance with the features of a competency-based approach to training.

Assessor and Instructor Qualifications

(b) All assessors and instructors should hold or have held appropriate qualifications and experiences commensurate with the level of training programme for which the privilege to assess or instruct is being sought.

(c) Qualified assessors and instructors may be assigned to carry out specific assessment, training, checking, testing and/or auditing duties to determine that all required performance standards have been satisfactorily achieved. These performance standards may have been established as a final objective or required to be met on a continuous basis. In either case, the assessors and instructors are responsible for making a determination of the actual standards attained and any recommendation for immediate remediation, if necessary.

(d) Prior to a training provider authorizing the provision of instruction within holistic competency-based training environments, assessors and instructors should undergo a selection process designed to ensure the individual's motivation and disposition are suitable for the assessor's and instructor's role.

(e) Training programmes for the assessor and instructor role should focus on development of the competencies listed in the attachment to this guidance, in the following areas:

(1) manage safety;

(2) prepare the training environment;

(3) manage the trainee;

(4) conduct training;

(5) perform trainee assessment;

(6) perform course evaluation; and

(7) continuously improve performance.

(f) All assessors and instructors should successfully complete a formal assessor and instructor competency assessment during the conduct of practical training. The final assessment of assessor and instructor competence should be made against the competency.

(g) All assessors and instructors should receive refresher training, and be reassessed using a documented training and assessment process acceptable to the appropriate authority, implemented by a certificated or accepted provider, or at appropriate intervals. Such refresher training and reassessment intervals should not exceed three years.

4. COMPETENCIES OF COURSE DEVELOPERS, ASSESSORS AND INSTRUCTORS

(a) The competency framework for course developer, assessor and instructor consists of competency units, competency elements and performance criteria. The competency framework for course developer, assessors and instructors are detailed in Table-2 and Table-3 below:

Table-81: Competence standards for a course developer

Unit	Title	Performance Criteria
Develop competency-based training and assessment	1. Conduct analysis	1. Conduct preliminary analysis 2. Conduct job and task analysis 3. Conduct population analysis
	2. Develop training material	4. Design curriculum 5. Define training objectives 6. Design mastery tests 7. Design modules 8. Determine training strategy 9. Select training media 10. Produce competency-based training and assessment materials 11. Carry out developmental testing of competency-based training and assessment materials
	3. Evaluate training material	12. Validate competency-based training materials 13. Evaluate whether job performance objectives are met

		14. Evaluate whether provideral and operational objectives are met

Table-82: Competence standards for assessor and instructor

Unit	Title	Performance Criteria
1 — Managing training safety	competent instructor and assessor should ensure a safe training / evaluation environment at all times. The competent instructor and assessor should ensure the safety of trainees in his/her care.	**Ensures a safe training environment** • P1. ensures that required equipment meets safety requirements; • P2. communicates evacuation procedures; • P3. ensures a safe operating environment (e.g. for aircraft: weather, fuel); • P4. identifies hazards and manages them; • P5. creates an appropriate safe learning environment; and • P6. identifies and takes appropriate action to prevent physical or mental stress. **rvenes when required for safety** • P7. transfers control of aircraft or equipment safely; • P8. intervenes, when required for safety, appropriately at the correct time and level (e.g. verbally or by taking control); • P9. recommences training as soon as practicable (after any safety intervention).
Unit 2 — Preparing the training environment	gnizing that the training provider is the controlling agency in providing the required environment, the competent instructor and assessor should ensure, to the	**Follows accepted training syllabus** • P1. explains that the training is needed

	extent possible, that the training environment provides for effective learning. training environment includes facilities, equipment and instructional materials. The following elements should be)ted to the size and processes of the provider. The instructor and assessor should consider the following sub-elements as essential to a successful outcome.	• P2. ensures that the training is logically structured (where there is a need for the instructor to influence the flow of the training programme) • P3. ensures that the training is realistic and relevant • P4. ensures that there are specific and measurable objectives • P5. ensures realism in the choice of scenarios. **res adequate facilities and equipment** • P6. ensures that the facilities are scheduled and adequate to meet the learning outcomes objectives • P7. ensures that the physical environment is suitable for learning • P8. ensures that the environment and conditions exist for the training objectives • P9. ensures that the equipment is suitable, adequate and serviceable • P10. arranges appropriate airspace for the required training, if applicable.
3 — Managing the trainee	competent instructor and assessor should ensure that the training is appropriate to the trainees and their needs.	**Understands trainees** • P1. identifies and demonstrates awareness of trainee characteristics (experience, language, culture) • P2. determines learning needs • P3. demonstrates awareness of learning styles • P4. selects or modifies instructional materials and methods as appropriate.

		hes trainees • P5. demonstrates awareness of any measurable indicators of trainee readiness for training (as far as possible) • P6. exercise flexibility and supportive to trainee's performance and needs • P7. develops appropriate relationship with trainees • P8. develops and sustains trainee's motivation.
nit 4 — Conducting training	competent instructor and assessor should demonstrate a variety of instructional and assessment methods as required for the training.	**Establishes and maintains credibility** • P1. demonstrates exemplary behaviour as a role model (i.e. the instructor demonstrates the expected behaviour in the technical role for which trainees are being trained, according to the competencies and related KSA) • P2. establishes credentials • P3. demonstrates respect for provideral goals and requirements (standard operating procedures, dress codes, appearance, acceptable personal conduct, etc.) • P4. states clear objectives and clarifies roles for the training or evaluation being undertaken • P5. establishes and maintains an atmosphere of mutual respect. **onstrates effective presentation skills** • P6. stimulates and sustains trainee's interest

		• P7. sequences and paces instruction appropriately • P8. uses the voice effectively • P9. uses eye contact effectively • P10. uses gestures, silence, movement and training aids effectively • P11. demonstrates effective questioning skills **onstrates effective instruction and facilitation** • P12. communicates effectively both verbally and non-verbally • P13. listens actively and reads non-verbal messages correctly • P14. asks appropriate questions to encourage learning or to confirm understanding • P15. answers questions correctly and adequately • P16. generates content by questioning, redirecting, balancing participation, etc. • P17. provides structure by confirming understanding, paraphrasing, summarizing, etc. **tes and sustains realism** • P18. ensures realism in the choice of scenario administered • P19. maintains a realistic approach in the conduct of the scenario **ages time** • P20. allocates time appropriately on activities

		• P21. adjusts time spent on activities to ensure that objectives are met • P22. implements contingency plans for situations in which activities should be eliminated, reduced or replaced
5 — Performing trainee assessment	competent instructor and assessor should assess the trainee appropriately, objectively and correctly.	**Develops assessment methods** • P1. selects appropriate events and activities through which to observe trainee's performance • P2. clarifies assessment process and rules with trainee • P3. communicates to trainees the criteria upon which their performance will be assessed **itors trainee's performance during instruction** • P4. observes behaviours • P5. interprets observed behaviours and comments correctly • P6. allows trainee to self-correct in a timely manner • P7. identifies individual differences in learning rates **es objective assessments** • P8. compares trainee's performance outcomes to defined objectives • P9. applies performance standards fairly and consistently • P10. ensures a level of knowledge and skill that achieves an appropriate level of safety

		• P11. observes and encourages self-assessment of performance against performance standards • P12. confidently makes decisions on outcome of the task. **ides understandable and actionable feedback** • P13. ensures that the training provider fully comprehends the assessment • P14. applies appropriate corrective actions • P15. uses facilitation techniques where appropriate • P16. provides positive reinforcement • P17. encourages mutual support • P18. develops and seeks agreement on any plan for improvement or remediation **uces training and performance reports** • P19. keeps appropriate and adequate training and performance records • P20. reports clearly and accurately on trainee's performance using only observed behaviours reflecting KSA • P21. follows up on corrective actions • P22. reports recognized training opportunities within the training system in order to improve the process • P23. respects confidentiality
6 — Performing course evaluation	competent instructor and assessor should evaluate the effectiveness of the training system.	**Self-evaluates the effectiveness of his/her own performance as an instructor**

		• P1. evaluates his/her own communication skills • P2. evaluates his/her own presentation skills • P3. evaluates his/her own facilitation skills • P4. evaluates his/her own use of training media • P5. evaluates his/her own use of instructional materials • P6. evaluates his/her own assessment of trainees. **uates the effectiveness of a course or phase of a course** • P7. evaluates trainees' feedback on the training process • P8. evaluates trainees' mastery of final course objectives • P9. evaluates the effect of facilities on trainees' performance • P10. evaluates the effect of equipment on trainees' performance • P11. evaluates the effect of training materials on trainees' performance • P12. evaluates the effect of the management of the training programme on trainees' performance *Note.— The management of the training programme refers to the policies and decisions (or lack of decisions) of the provider's management team regarding the training programme.* **Reports information on course evaluation** • P13. identifies strengths and/or weaknesses of the training course

		• P14. identifies systemic safety issues • P15. identifies unexpected outcomes • P16. identifies barriers to the transfer of learning • P17. makes recommendations for improvements to course design • P18. makes recommendations for improvements to course documentation • P19. makes recommendations for improvements to training media and facilities • P20. shares information with other instructors and management.
7 — Continuously improve performance	competent instructor and assessor should continuously improve the performance of the training system.	**Evaluates effectiveness** • P1. encourages and welcomes feedback on his/her own performance as an instructor • P2. evaluates his/her own performance as an instructor and learns from the results • P3. actively seeks feedback on the training course from trainees and peers **ins personal development** • P4. maintains required qualifications • P5. strives to increase and update relevant knowledge and skills • P6. demonstrates continuous improvement of instructor competencies.

5. ESTABLISHING An ARFFS CBTA PROGRAMME

(a) Scope

(1) In order to establish and implement an effective CBTA programme, the training provider should consider a systematic approach which is based on the following phases:

(i) Establish competence maps for each identified rank

(ii) Carry out a task analysis for each rank

(iii) Complete a training needs analysis

(iv) Establish a training syllabus

(v) Establish a proficiency check programme

(vi) Establish a validation and review programme

(b) Establish competence maps for each identified role

(1) Competence-maps have been established within this guidance for the generic roles of:

(i) ARFFS Operational personnel – Watchroom attendant, Firefighter and Senior Firefighter

(ii) ARFFS Supervisory personnel – Crew, Watch and Station Commanders

(iii) ARFFS Managerial personnel – Unit Commander, Deputy and Chief Fire Officer

(c) Competence-mapping refers to the collection of tasks grouped together, defining the activities relevant to a particular grade. Within the tasks are critical functions which have to be carried out to ensure the objective is achievable.

(d) The ARFFS may choose to adopt their own specific terms within the generic terminology of Supervisor and Manager. There is no such thing as a “typical” Firefighter, as all roles at aerodrome can vary due to a number of factors such as risk, resource availability, and organisational structure.

(e) Competence-maps provide a tool against which performance can be assessed and measured in order to plan for the four stages of development, namely:

(1) Learning and development.

(2) Achievement of competence.

(3) Maintenance of competence.

(4) Continuous Professional Development (CPD).

6. CONDUCTING A Training Analysis

(a) Training Needs Analysis

(1) A training needs analysis should be conducted to identify the underpinning knowledge, understanding and skills required to carry out the tasks of ARFFS personnel in relation to their roles, i.e., Operational, Supervisors and Managers. This analysis will also include

an evaluation process which measures the outcomes of the training provided by the aerodrome, against the published aims and objectives of the training programme to ensure that these are being achieved.

(2) It is important to understand that completion of a training course does not, in isolation, determine that someone is competent. Competence can only be assessed and confirmed when there is sufficient and satisfactory evidence of consistent workplace performance.

(b) Training Frequency Analysis

(1) Upon the formulation and completion of the task and training needs analysis the next fundamental element of this scheme is to determine how many times specific tasks/functions have to be carried out in the workplace to ensure that operational competency is maintained at all times.

(2) This training frequency analysis is based on an assessment of four areas relating to the training for competency.

(i) Change: i.e. does the subject change much over time?

(ii) Repetition: i.e. how often is the subject/skill practised in normal work?

(iii) Complexity: i.e. how difficult is the subject/skill?

(iv) Risk: i.e. what are the consequences of poor performance?

(c) Training Facilities Analysis

(1) A detailed assessment needs to be carried out on what appropriate training simulator and training aids will be required, to ensure that the ARFFS maintains its operational competency in relation to the type and frequency of aircraft operations.

(2) Training facilities and equipment should commensurate with the level of aerodrome rescue and firefighting protection provided at the aerodrome. Where an aerodrome operator manages multiple aerodrome rescue and firefighting services, the provision of a centralised training facility can be considered provided that the facility provides the necessary training simulations catering to the specific needs of the RFF personnel employed at these aerodromes.

(3) The provision of kerosene-based fuel can be considered for live fire trainings to provide the necessary realism and exposure to RFF personnel. Where the use of such fuel is prohibited or restricted due to environmental laws and regulations, a suitable alternative fuel or a liquefied petroleum gas (LPG) may be selected provided it delivers sufficient characteristics to a kerosene-based fuel in terms of radiant heat and

performance. Where an alternative training fuel is selected, RFF personnel should be informed of the differences in firefighting and the use of such fuel should not create additional hazards and risks to RFF personnel.

AMC3 TRG.OR.D.005 Aerodrome rescue and firefighting personnel — training

Core training subject areas for ARFFS personnel

(a) Core training subject areas for aerodrome rescue and firefighting personnel should, at least, include:

(1) aerodrome familiarisation – terminals, ATC tower, aircraft stands, maintenance hangars, fuel farms, 1 000 m area, access roads, crash gates, etc;

(2) aircraft familiarisation – fixed wing, rotary, etc;

(3) personnel safety;

(4) emergency communications systems on the aerodrome, including aircraft and building fire-related alarms;

(5) use of the firefighting hoses, nozzles, turrets, and other appliances;

(6) application of the types of extinguishing agents required;

(7) emergency aircraft evacuation assistance;

(8) firefighting tactics and techniques in dealing different aircraft systems and components;

(9) rescue strategies;

(10) adaptation and use of structural aerodrome rescue and firefighting equipment for aircraft rescue and firefighting;

(11) dangerous goods / hazardous materials including biological, chemical and radiological;

(12) familiarisation with RFF personnel' duties under the aerodrome emergency plan;

(13) low visibility procedures;

(14) human factors and performance, including team coordination;

(15) personal protective and respiratory protection equipment;

(16) composite materials / man-made mineral fibres;

(17) new hazards – lithium battery, hydrogen and alternative aviation fuel, etc;

(18) recognition of aircraft ballistic parachute systems during emergency operations;

(19) operational communications;

(20) airside driving (driver/operator);

(21) vehicle/vessel familiarisation (driver/operator); and

(22) vehicle/vessel operations including high reach extendible turret (driver operator);

(23) where RFF personnel are assigned specialised rescue duties, additional trainings include:

(i) incidents involving domestic fires at the aerodrome;

(ii) incidents involving difficult environments,

(iii) incidents involving working at height, etc.

(24) Additional trainings for supervisors and managers:

(i) incident command appropriate to the level of authority;

(ii) leadership and management;

(iii) decision-making; and

(iv) training and development.

(v) fire prevention, etc

GM1 AMC3 TRG.OR.D.005 Core training subject areas for ARFFS personnel

CORE Training Subject Areas

(a) The training areas shown below cover subjects necessary for initial, on job and recurrent competency training. The following list of areas is representative but not exhaustive. Table-6 may be used to construct a balanced CBTA programme.

Table 83: Core Training Subject Areas

ARFFS Training Subject Areas	
Core Subjects	**Performance Requirements**
1. Aerodrome Familiarisation	1.1. Demonstrate ability to recognize the runway and taxiway identification system and associated pavement marking, lighting and signs 1.2. Demonstrate compliance with local rules regarding vehicle movements and access 1.3. Demonstrate ability to locate a given point on the aerodrome using references given by Air Traffic Control 1.4. Demonstrate ability to locate all emergency access routes and other non-standard routes used to traverse areas where aircraft accidents may occur including 1 000 metres area, difficult environments and runway undershoot/overshoot areas 1.5. Demonstrate understanding of special procedures and equipment during low visibility conditions

	1.6. Demonstrate ability to identify areas where hazardous materials including freight may be stored 1.7. Demonstrate ability to identify air traffic control tower, terminal buildings, apron area, maintenance hangars or aircraft storage areas, fuel farm facility, etc. 1.8. Demonstrate ability to identify new technological hazards/risks – large battery energy storage and charging facilities in airside, etc.
2. Aircraft Familiarisation	2.1. Demonstrate ability to identify and locate normal entry doors and emergency exits for aircraft normally using the aerodrome and describe methods of operation, 2.2. Demonstrate ability to describe slide deployment and methods of evacuation, 2.3. Demonstrate ability to identify aircraft seating and cargo configurations, 2.4. Demonstrate ability to locate and utilise aircraft break-in areas where installed, 2.5. Demonstrate ability to locate and utilise battery isolators, 2.6. Demonstrate ability to locate and utilise installed aircraft fire protection systems, 2.7. Demonstrate ability to identify types of fuel and locations of fuel tanks, 2.8. Demonstrate ability to identify component parts of aircraft using correct terminology, 2.9. Demonstrate ability to identify aircraft construction materials and describe the hazards arising from aircraft construction – composite materials, man-made mineral fibres, lithium batteries, etc.
3. Aerodrome Emergency Planning	3.1. Demonstrate understanding aerodrome incident management system 3.2. Demonstrate understanding of the notification and alerting process in an emergency 3.3. Demonstrate ability to recognise different types of emergencies contained in the emergency plan

	3.4. Demonstrate understanding of the different roles and responsibilities of all agencies for on-aerodrome and off-aerodrome emergencies as described in aerodrome emergency plan 3.5. Demonstrate understanding relevant roles and responsibilities of all agencies relating to aircraft accident investigation and disabled aircraft removal
4. Radio Communications	4.1. Demonstrate aviation language proficiency appropriate to the roles. 4.2. Demonstrate ability to identify relevant radio frequencies used at the aerodrome. 4.3. Demonstrate understanding of aerodrome radiotelephony requirements 4.4. Demonstrate ability to communicate using radio equipment, procedures, terminologies, and standard messages. 4.5. Demonstrate emergency hand signals used to communicate with the aircraft flight crew
5. Personal Safety (personal & respiratory protective equipment)	5.1. Demonstrate ability to identify the hazards arising from aircraft incidents and aircraft systems 5.2. Demonstrate correct and expeditious use of personal protective equipment 5.3. Demonstrate understanding of the limitations of personal protective equipment 5.4. Demonstrate techniques to be used when working in confined areas 5.5. Demonstrate techniques to be used when trapped or disoriented, 5.6. Describe the purpose and limitations of self-contained breathing apparatus (SCBA) 5.7. Demonstrate correct and expeditious donning and start up procedures for SCBA 5.8. Demonstrate use of SCBA in actual or simulated conditions i.e. smoke, heat and humidity etc. 5.9. Demonstrate correct techniques when working as a team in SCBA,

	5.10. Demonstrate emergency actions to be taken in the event of low air, distress signal unit (DSU) operations, unit malfunction, face mask displacement, etc.
6. Fire Science, Dynamics and Toxicity	6.1. Demonstrate understanding on fire behaviour, heat transfer and fire classifications 6.2. Demonstrate ability to differentiate fire behaviour and its extinguishing methods in a compartment 6.3. Demonstrate an understanding of the fire characteristics and toxicity of materials used in aircraft construction including aviation fuel, lithium batteries, etc. 6.4. Demonstrate understanding of the fire characteristics of materials used in aircraft hangar/building construction including dangerous goods.
7. Extinguishing Agents and extinction methods	7.1. Demonstrate understanding of the different types and characteristics of extinguishing agents – principal and complement agents; 7.2. Demonstrate understanding of the principles of fire initiation, spread and suppression/extinction 7.3. Demonstrate ability to apply different fire extinguishing methods
8. Foam Monitors/Bumper Turrets/HRET	8.1. Demonstrate operation of foam monitors in jet and dispersed pattern 8.2. Demonstrate correct application methods 8.3. Demonstrate judicious use of extinguishing agents 8.4. Demonstrate understanding of the effects of wind on foam monitor use 8.5. Demonstrate understanding and operations of high reach extendible turret technology (HRET) in different scenarios
9. Hand Line Use	9.1. Demonstrate selection and deployment of hand lines, branches and nozzles, 9.2. Demonstrate correct application of foam, foam solution and water 9.3. Demonstrate judicious use of extinguishing agents,

	9.4. Demonstrate understanding of the effect of wind on hand line and branch pipe effectiveness
10. Complementary Agent	10.1. Demonstrate ability to select and deploy complementary agents carried onboard vehicle/vessel 10.2. Demonstrate correct application of complementary agents 10.3. Demonstrate tactics for dual agent application 10.4. Demonstrate understanding of the effects of wind on complementary agent application
11. Rescue Tools / Equipment	11.1. Demonstrate ability to identify, locate and use of each tool carried onboard vehicle/vessel 11.2. Demonstrate understanding of the safety procedures necessary when operating equipment 11.3. Demonstrate tactical use of each tool carried onboard vehicle/vessel 11.4. Demonstrate ability to select, operate and climb different types of fire service ladder 11.5. Demonstrate ability to inspect and test rescue tool/equipment according to OEM procedures
12. Water supply	12.1. Demonstrate ability to identify location of local water supplies, 12.2. Demonstrate ability to replenish vehicle/vessel using local water supplies (fire hydrants, tanks, static water, etc.) rapidly 12.3. Demonstrate ability to inspect and test supplementary water supply
13. Firefighting tactics and techniques	13.1. Demonstrate fire suppression techniques. 1. Direct straight stream firefighting method; 2. Indirect firefighting method; and 3) the three-dimensional method 13.2. Demonstrate correct firefighting tactics for a variety of scenarios involving aircraft normally using the aerodrome (engines, undercarriage, APU, cargo hold, avionics, lithium-ion batteries, etc) 13.3. Demonstrate tactics and techniques for securing and maintaining rescue paths

	13.4. Demonstrate tactics and techniques to protect aircraft fuselage from fire exposure 13.5. Demonstrate tactics and techniques to control/extinguish three dimensional fires 13.6. Demonstrate tactics and techniques for maintaining integrity of foam blankets 13.7. Demonstrate tactics and techniques for controlling/containing fuel spillage 13.8. Demonstrate correct casualty handling and removal from an aircraft fuselage
14. Casualty triage and medical care	14.1. Demonstrate ability to perform primary and secondary surveys for life threatening injuries 14.2. Demonstrate ability to establish airway 14.3. Demonstrate ability to perform cardiopulmonary resuscitation 14.4. Demonstrate ability to identify and treat internal/external bleeding 14.5. Demonstrate ability to identify and treat casualty suffering from shock 14.6. Demonstrate ability to identify injuries to skull, spine, chest and extremities 14.7. Demonstrate ability to identify internal injuries 14.8. Demonstrate ability to place casualties in recovery position 14.9. Demonstrate ability to handle casualties 14.10. Demonstrate ability to treat burns 14.11. Demonstrate understanding of particular problems related to injured children/babies 14.12. Demonstrate ability to manage unconscious casualties/ deceased person 14.13. Demonstrate understanding and application of triage protocols at aircraft accident
15. Drive and operate vehicle/vessel in emergency and non-	15.1. Demonstrate understanding of all automotive and firefighting performances for vehicle/vessel operator

emergency conditions	15.2. Demonstrate ability to drive and operate all equipment controls in accordance with OEM procedures for vehicle/vessel operator 15.3. Demonstrate ability to drive and operate within limits of design for vehicle/vessel operator 15.4. Demonstrate ability to drive and operate in compliance with legislation and local by-laws for vehicle/vessel operator 15.5. Demonstrate ability to drive and operate in non-emergency and emergency conditions for vehicle/vessel operator 15.6. Demonstrate ability to operate and traverse in difficult terrain for vehicle/vessel operator 15.7. Demonstrate ability to site and position equipment at an aircraft incident for vehicle/vessel operator 15.8. Demonstrate ability to operate firefighting pump 'on the move'. for vehicle/vessel operator 15.9. Demonstrate ability to operate HRET in different aircraft simulated fire conditions for vehicle operator 15.10. Demonstrate ability to perform safe navigation in all conditions for vessel operator 15.11. Demonstrate ability to perform man overboard procedure for vessel operator
16. Rescue in difficult environments	16.1. Demonstrate understanding of the types of hazards and risks when performing rescue at difficult environments 16.2. Demonstrate ability to select appropriate PPE and rescue equipment 16.3. Demonstrate safe operations of rescue equipment 16.4. Demonstrate ability to select, deploy and direct rescue strategies and tactics 16.5. Demonstrate ability to assess priorities to maximise passenger survivability
17. Command competence	17.1. Demonstrate understanding of incident command structure and principles appropriate to the role 17.2. Demonstrate understanding the different roles and responsibilities in incident command

	17.3. Demonstrate understanding of 'safe person' concept 17.4. Demonstrate command competencies appropriate to the role - span of control, sectorisation, risk assessment, decision making, tactics, etc. 17.5. Demonstrate ability to assess priorities to maximise passenger survivability 17.6. Demonstrate ability to select, deploy and direct incident command strategies and tactics appropriate to the role 17.7. Demonstrate ability to manage resources to ensure effectiveness 17.8. Demonstrate ability to coordinate and communicate with external agencies appropriate to the role 17.9. Demonstrate ability to operate at bronze and/or silver command appropriate to the role 17.10. Demonstrate ability to select, conduct and evaluate training and proficiency checks at station/unit appropriate to the role
18. Watchroom Operations	18.1. Demonstrate proficiency in aviation english language both in written and spoken appropriate for the role 18.2. Demonstrate understanding aerodrome emergency planning arrangements 18.3. Demonstrate understanding different watchroom notification and alerting systems 18.4. Demonstrate ability to operate radio communication equipment 18.5. Demonstrate ability to record and maintain watchroom occurrence log 18.6. Demonstrate ability to obtain accurate and complete information 18.7. Demonstrate ability to raise the alarms within acceptable timescales 18.8. Demonstrate ability to alert external mutual aid agencies 18.9. Demonstrate ability to write an incident report
19. Leadership performance	19.1. Demonstrate understanding of different leadership competencies for the different roles

	19.2. Demonstrate understanding of leading and managing personnel to achieve peak performance under a challenging operating environment for the different roles. 19.3. Demonstrate ability to perform as a leader appropriate to the role.
20. Fitness	20.1. Demonstrate understanding of the importance of fitness in aerodrome rescue and firefighting activities. 20.2. Demonstrate the types of fitness components related to aerodrome rescue and firefighting activities – aerobic, anaerobic, strength and flexibility. 20.3. Demonstrate appropriate fitness level commensurate with the equivalent intensity generated in the performance of RFF operations, which include the use of breathing apparatus, hand-lines, ladders, heavy equipment and other associated rescue operations such as casualty handling, etc.
21. Dangerous goods / hazardous materials	21.1. Demonstrate understanding all classes of dangerous goods as per ICAO Technical Instructions 21.2. Demonstrate understanding of the different hazards and risks for the different classes of dangerous goods 21.3. Demonstrate understanding of different types of personal protective clothing and its limitations 21.4. Demonstrate understanding in the use of different types of detection and monitoring equipment. 21.5. Demonstrate understanding of the different decontamination procedures 21.6. Demonstrate ability to respond and adopt appropriate actions at an operational incident as emergency responders
22. Fire prevention	22.1. Demonstrate understanding principles of fire prevention 22.2. Demonstrate understanding of different types aerodrome fire hazards and risks 22.3. Demonstrate understanding of the different types of fire prevention equipment and systems.

	22.4. Demonstrate understanding of inspection and maintenance of fire prevention equipment and systems 22.5. Demonstrate ability to conduct and write fire risk assessment 22.6. Demonstrate ability to conduct fire prevention inspection 22.7. Demonstrate ability to write a fire prevention report 22.8. Demonstrate ability to conduct aerodrome fire safety promotion to the aerodrome community appropriate to the role

AMC4 TRG.OR.D.005 Aerodrome rescue and firefighting personnel — training

Competency standards for ARFFS personnel

(a) Competency standards for rescue and firefighting personnel should be in accordance with Table-5 for the following categories:

(1) Operational personnel: Watchroom operator (WR), firefighters (FF) and driver operator (FD) are directly involved in rescue and firefighting tasks and other operational activities;

(2) Supervisory personnel: Crew, watch and station commanders are responsible for supervising their teams at operational incidents and leading other administrative duties; and

(3) Managerial personnel: Unit commanders, deputy and chief fire officers are responsible for managing the ARFFS in terms of strategic planning, resource management, and overall operational safety oversight.

Table 84: Competency standards for ARFFS personnel

ARFFS Competency Unit	Operational Personnel (AFF)			Supervisory Personnel (AFS)			Managerial Personnel (AFM)		
	WR	FF	FD	CC	WC	SC	UC	DC	CO
CU 1. Operational Communication	C	C	C	C	C	C	C	C	C
CU 2. Maintain Operational Readiness	C	C	C	C	C	C	C	C	C
CU 3. Mobilise ARFFS Resources to Respond to Incidents	C								
CU 4. Don Personal Protective Equipment		C	C	C	C	C	C	C	C

CU 5. Operate ARFFS Appliances' Systems		C	C	C	C				
CU 6. Operate ARFFS Appliances' Monitors / Turrets		C	C	C	C				
CU 7. Deploy and Operate ARFFS Firefighting Equipment		C	C	C	C				
CU 8. Deploy & Operate ARFFS Primary and Secondary Extinguishing Media Units		C	C	C	C				
CU 9. Select & Operate ARFFS Rescue Equipment		C	C	C	C				
CU 10. Deploy & Climb ARFFS Ladders		C	C	C	C				
CU 11. Don and Operate in Breathing Apparatus (BA)		C	C	C	C	C			
CU 12. Drive, Operate, and Position ARFFS Appliances at Incidents			C	C	C				
CU 13. Response to Incidents Involving Aircrafts at Aerodromes		C	C	C	C	C	C	C	C
CU 14. Response to Aircraft Emergencies Outside Aerodromes		R	R	R	R	R	R	R	R
CU 15. Apply Triage and Medical Care to Casualties		C	C	C	C	C			
CU 16. Understand and Apply Airside Safety			C	C	C	C	C	C	C
CU 17. Drive ARFFS Appliances at Airside			C	C	C	C			
CU 18. Apply Command and Control at Incidents				C	C	C	C	C	C
CU 19. Implement ARFFS Actions to Resolve Incidents				C	C	C	C	C	C
CU 20. Manage Information for ARFFS Actions at Incidents				C	C	C	C	C	C

CU 21. Determine Solutions to Hazards and Risks at Incidents				C	C	C	C	C	C
CU 22. Educate Airport Community in Fire Safety and Prevention		R	R	R	R	R	R	R	R
CU 23. Conduct Aerodrome Fire Prevention Activities		R	R	R	R	R	R	R	R
CU 24. Understand and Apply Aerodrome Emergency Planning	C	R	R	C	C	C	C	C	C
CU 25. Understand and Apply Human Factors Principles	C	C	C	C	C	C	C	C	C
CU 26. Response to Incidents Involving Dangerous Goods (Hazardous Materials)		R	R	R	R	R	R	R	R
CU 27. Response to Incidents Involving Difficult Environments and 1000-metres Response Area		R	R	R	R	R	R	R	R
CU 28. Response to Incidents Involving Domestic Emergencies at Aerodromes		R	R	R	R	R	R	R	R
CU 29. Response to Incidents Involving Acts of Unlawful Interferences at Aerodromes		C	C	C	C	C	C	C	C
CU 30. Response to Medical Emergencies at Aerodromes		C	C	C	C	C	C	C	C
(C) Core competencies	**(R) Role-specific competencies**				**Not applicable**				

GM1 AMC4 TRG.OR.D.005 Competence standards for ARFFS personnel

COMPETENCY STANDARDS FOR ARFFS PERSONNEL

Introductory Note.

Competency standard: *An authoritative benchmark that defines the expected levels of performance, skills, knowledge, and behaviours required for individuals to perform their roles effectively within a specific industry or profession. It serves as a definitive guideline for both training and assessment, providing a clear framework for what constitutes proficiency in a given occupation or task. Competency standards are meticulously developed to ensure that individuals are equipped to meet the demands of their roles,*

particularly in high-stakes environments where precision, expertise, and adherence to best practices are crucial. They are widely used in sectors such as aviation, healthcare, emergency services, and technical industries, where the consequences of inadequate performance can be significant.

Competency Unit: *A specific area of performance relevant to the role. For example, in the aviation industry, competency units might include "Response to Aircraft Emergencies," "Fire Suppression Techniques," and "Emergency Medical Care."*

Performance Criteria: *Each competency unit includes detailed performance criteria that define what an individual should achieve to be considered competent. These criteria are measurable and specific, outlining the quality and quantity of performance expected in various tasks or scenarios.*

Knowledge Requirements: *Competency standards specify the theoretical understanding necessary to perform tasks effectively. This may include knowledge of industry regulations, operational procedures, safety protocols, and technical information related to specific equipment or systems.*

Skills and Abilities: *The standard identifies the practical skills and abilities that individuals should demonstrate. This includes technical skills such as operating equipment, as well as cognitive skills like problem-solving and decision-making in complex situations.*

Behavioural Attributes: *Competency standards often include behavioural attributes that reflect professional conduct. This can encompass teamwork, communication, leadership, and adherence to ethical and safety standards, all of which are critical in high-pressure environments.*

Assessment Guidelines: *Competency standards provide guidance on how to assess an individual's performance against the defined criteria. This can include both formative (ongoing) and summative (final) assessments, practical demonstrations, simulations, and theoretical examinations.*

1. Introduction

(a) This guidance document establishes the competency standards for Aerodrome Rescue and Firefighting Services (ARFFS) personnel employed in the United Arab Emirates (UAE), including operational, supervisory, and managerial roles. These standards are designed to ensure that all ARFFS personnel possess the necessary skills, knowledge, and behaviours to perform their duties effectively, maintaining high levels of safety, operational readiness, and compliance with UAE General Civil Aviation Authority (GCAA) regulations and international best practices.

2. Purpose and Scope

(a) The purpose of this document is to:

(1) Define the competency requirements for ARFFS personnel across different roles, including operational firefighters, supervisory staff, and managerial positions.

(2) Provide a framework for training, assessment, and professional development to ensure that all personnel meet the required competency standards.

(3) Support aerodrome operator in maintaining a high standard of safety and performance within their ARFFS units.

(b) This guidance applies to all aerodromes and heliports within the UAE that employ ARFFS personnel and is intended for use by aerodrome operator, ARFFS managers, training providers, and regulatory bodies overseeing ARFFS operations.

3. Competency Standards Overview

(a) Table 6 details each competency unit includes competency elements and performance criteria that define the expected skills, knowledge, and behaviours including assessment ratio required for each ARFFS personnel.

Table 85: Competency standards for ARFFS personnel

Competency Unit 1: Operational Communication				
This competency unit outlines the required competency elements, performance criteria, and the skills, knowledge, and behaviour needed for effective operational communication for ARFFS personnel in ensuring clear, concise, and effective communication during routine operations and emergency situations. **Skill Development:** The unit emphasises real-time application of communication skills, particularly in emergency contexts where ARFFS personnel should react swiftly and accurately. **Behavioural Expectations:** Given the high-stakes nature of ARFFS operations, effective communication behaviour, such as maintaining calm under pressure, adhering to protocols, and showing cultural sensitivity, is crucial to the safety and success of the mission. **Assessment Ratio:** The recommended split between theoretical knowledge and practical application reflects the critical importance of both the understanding and hands-on use of communication skills. Emphasis is placed on practical assessments for competencies that are essential during high-stress, real-world scenarios.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
1: Operational Communication	1. Communication Protocols and Terminology	a. Demonstrates clear understanding and use of standard GCAA phraseology, ARFFS-specific terminology, and communication protocols.	**Skill:** Accurate and timely use of GCAA-compliant radio phraseology and ARFFS terminology. **Knowledge:** Understanding of GCAA standards, ARFFS protocols, and radio communication standards.	60% Theoretical 40% Practical

			Behaviour: Adheres to established communication protocols.	
	2. Listening and Comprehension	a. Demonstrates ability to listen actively to instructions and information communicated in English. b. Accurately interprets and responds to spoken English instructions.	**Skill:** Active listening and timely comprehension of English language communications. **Knowledge:** Familiarity with common emergency communication terms. **Behaviour:** Focused and responsive during communication.	40% Theoretical 60% Practical
	3. Clarity of Spoken Communication	a. Conveys messages in clear, concise English with appropriate tone, speed, and volume for radio communications. b. Avoids ambiguity in high-stress situations.	**Skill:** Ability to articulate clearly, avoiding miscommunication. **Knowledge:** Understanding the importance of clarity in ARFFS communication. **Behaviour:** Calm, professional tone under pressure.	30% Theoretical / 70% Practical

	4. Written Communication	a. Produces accurate and well-structured reports and incident logs in English. b. Uses correct grammar, spelling, and ARFFS-related terminology in written communications.	**Skill:** Writing concise, accurate incident reports. **Knowledge:** Knowledge of report writing standards and incident documentation processes. **Behaviour:** Detail-oriented and precise in written communication.	70% Theoretical / 30% Practical
	5. Team Communication	a. Effectively communicates with ARFFS team members and other emergency responders in English. b. Maintains situational awareness through consistent communication.	**Skill:** Team-oriented communication to ensure safety and coordination. **Knowledge:** Familiarity with multi-agency communication standards. **Behaviour:** Collaborative and open in sharing information during incidents.	50% Theoretical / 50% Practical

	6. Emergency Communication under Stress	a. Maintains clear, concise communication in high-pressure and emergency scenarios. b. Adheres to priority protocols when reporting critical information.	**Skill:** Ability to remain calm and communicate clearly under stress. **Knowledge:** Knowledge of emergency prioritisation protocols and stress management techniques. **Behaviour:** Demonstrates control in stressful situations.	40% Theoretical / 60% Practical
	7. Cross-Cultural Communication	a. Adapts communication style to ensure clear understanding by non-native English speakers. b. Shows cultural awareness in communication with international stakeholders.	**Skill:** Ability to modify communication to overcome language barriers. **Knowledge:** Awareness of cultural differences in communication styles. **Behaviour:** Respectful and patient in interactions with non-native speakers.	60% Theoretical / 40% Practical
	8. Use of Communication Technology	a. Proficient in using radio equipment, telecommunic	**Skill:** Effective operation of communication devices. **Knowledge:** Understandi	40% Theoretical / 60% Practical

		ation devices, and other communicatio n technology for ARFFS operations. b. Troubleshoots basic communicatio n technology issues.	ng the operation and maintenance of ARFFS communicati on equipment. **Behaviour:** Technologica lly adept and resourceful in resolving minor issues.	

Competency Unit 2: Maintain Operational Readiness				
This competency unit addresses the essential skills, knowledge, and behaviours required by ARFFS personnel to ensure a constant state of operational readiness, with a focus on maintaining equipment, personal preparedness, and readiness for emergency response. **Skill Development:** This unit stresses continuous operational readiness, where ARFFS personnel should be vigilant in maintaining equipment, station readiness, personal fitness, and communication systems at all times. **Behavioural Expectations:** Personnel are expected to exhibit professionalism, a proactive attitude, and commitment to operational excellence, ensuring that readiness is not compromised under any circumstances. **Assessment Ratio:** The emphasis on practical assessment reflects the critical importance of hands-on application in maintaining operational readiness. Theoretical knowledge supports the practical ability to ensure readiness for immediate response in real-world emergencies.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDG E & BEHAVIOUR**	**ASSESSMEN T RATIO**
- Maintain Operational Readiness	1. Equipment Inspection and Maintenance	a. Conducts thorough and regular inspections of all firefighting, rescue, and personal protective	**Skill:** Proficiency in inspecting ARFFS vehicles, PPE, and firefighting tools. **Knowledge:** Understandi ng of equipment functionality and	30% Theor etical / 70% Practical

		equipment (PPE). b. Identifies and addresses defects promptly.	maintenance protocols. **Behaviour:** Proactive in ensuring equipment is operationally ready.	
	2. Operational Preparedness	a. Ensures personal fitness and mental readiness for immediate deployment in emergencies. b. Maintains currency in operational procedures and tactical response strategies.	**Skill:** Ability to maintain physical fitness and mental focus for emergency response. **Knowledge:** Awareness of current response procedures and tactics. **Behaviour:** Disciplined in self-assessment and readiness maintenance.	40% Theoretical / 60% Practical
	3. Communication Readiness	a. Ensures communication equipment (radios, alarm systems) is fully operational and tested before shifts. b. Follows proper radio check	**Skill:** Proficient in testing and verifying communication systems. **Knowledge:** Understanding of communication systems used in ARFFS operations. **Behaviour:** Methodical in conducting pre-shift	30% Theoretical / 70% Practical

		protocols and communication setup.	communication system checks.	
	4. Monitoring Weather and Environmental Conditions	a. Actively monitors and responds to changing weather conditions affecting ARFFS operations. b. Adjusts operational readiness plans based on environmental conditions.	**Skill:** Ability to assess and react to changing weather and environmental factors. **Knowledge:** Awareness of how environmental factors affect emergency response. **Behaviour:** Vigilant in adjusting readiness to dynamic conditions.	50% Theoretical / 50% Practical
	5. Station and Vehicle Readiness	a. Conducts regular station and ARFFS vehicle inspections, ensuring cleanliness and full operational capability. b. Ensures supplies and resources are	**Skill:** Attention to detail in maintaining a clean, well-equipped station and vehicles. **Knowledge:** Understanding of station operational requirements. **Behaviour:** Organised and systematic in maintaining readiness of facilities.	40% Theoretical 60% Practical

		stocked and maintained.		
	6. Readiness Drills and Simulations	a. Participates in and leads readiness drills, ensuring compliance with response time standards. b. Applies operational readiness principles during practical simulations.	**Skill:** Effective participation in and management of readiness drills. **Knowledge:** Understanding of GCAA standards on response time and readiness drills. **Behaviour:** Committed to continuous improvement through regular practice.	30% Theoretical / 70% Practical
	7. Personal Safety and Fitness	a. Maintains personal fitness in accordance with ARFFS fitness requirements. b. Undergoes regular medical and fitness checks as required by ARFFS standards.	**Skill:** Maintaining physical and mental resilience for emergency duties. **Knowledge:** Knowledge of personal fitness standards and their impact on readiness. **Behaviour:** Diligent in personal health and fitness maintenance.	20% Theoretical / 80% Practical

Competency Unit 3: Mobilise ARFFS Resources to Respond to Incidents				
This competency unit ensures that ARFFS (Aircraft Rescue and Firefighting Services) watchroom Aerodrome operator are fully equipped to mobilise resources effectively and efficiently in response to incidents. This unit covers key responsibilities, including incident detection, communication, coordination, and resource deployment, ensuring that the mobilisation process is timely, accurate, and aligned with operational needs.				
Skill Development: This unit develops key competencies in resource mobilisation, incident assessment, communication, and coordination with internal and external teams. The focus is on ensuring that Aerodrome operator can respond quickly, accurately, and efficiently in dynamic situations. **Behavioural Expectations:** Watchroom Aerodrome operator are expected to demonstrate alertness, clear communication, and decisive action during incident mobilisation. Coordination, situational awareness, and accountability are critical to managing resources effectively in high-pressure environments. **Assessment Ratio:** Practical assessments are prioritised to ensure that watchroom Aerodrome operator can apply theoretical knowledge in real-time scenarios. The ability to mobilise resources quickly and effectively is crucial, and hands-on proficiency is essential for operational success. Theoretical understanding supports decision-making and ensures adherence to protocols.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
3: Mobilise ARFFS Resources to Respond to Incidents	1. Incident Detection and Alarm Activation	a. Accurately detects and verifies incidents through various systems (CCTV, radar, alarm systems, communication channels). b. Activates the appropriate alarm protocols immediately	- **Skill**: Proficient in identifying incidents through multiple detection systems, confirming emergencies, and triggering alarms. - **Knowledge**: Understanding of detection systems, alarm types, and verification protocols. - **Behaviour**: Vigilant, alert, and decisive in detecting	50% Theoretical 50% Practical

		upon confirmation of an incident.	incidents and initiating timely alarm responses.	
	2. Rapid Assessment and Information Gathering	a. Gathers essential information about the incident (location, nature, scale) swiftly and accurately. b. Relays accurate information to the incident commander and responding ARFFS teams.	- **Skill**: Proficient in extracting and assessing critical details from available sources to inform operational decisions. - **Knowledge**: Familiarity with key incident data points (e.g., aircraft type, number of passengers, fuel load) and assessment techniques. - **Behaviour**: Systematic and efficient in gathering information, ensuring clarity and accuracy in communication.	40% Theoretical 60% Practical
	3. Mobilisation of ARFFS Resources	a. Initiates the mobilisation of ARFFS resources (personnel, appliances, equipment) based on	- **Skill:** Competent in dispatching the appropriate ARFFS resources according to incident protocols. - **Knowledge:** Awareness of	40% Theoretical 60% Practical

		incident type and scale. b. Coordinates deployment timings and ensures readiness of all necessary resources.	ARFFS resource capabilities, response protocols, and operational readiness requirements. - **Behaviour:** Decisive and organised in mobilising resources, ensuring prompt and effective deployment aligned with the scale of the incident.	
	4. Communication with Incident Commanders and Responders	a. Maintains clear, concise, and continuous communication with the incident commander, ARFFS teams, and external agencies. b. Provides real-time updates on the evolving situation, resource deployment, and incident status.	- **Skill:** Proficient in establishing and maintaining effective communication across multiple channels. - **Knowledge:** Understanding of communication protocols, incident command system (ICS), and radio telephony (RT) procedures. - **Behaviour:** Focused, clear, and authoritative in communicati	40% Theoretical 60% Practical

			on, ensuring critical information is relayed without delays or ambiguity.	
	5. Coordination with External Agencies	a. Coordinates effectively with external agencies (e.g., airport authorities, emergency medical services, police, and fire services) for joint incident response. b. Ensures all agencies are informed and integrated into the response plan.	- **Skill:** Capable of engaging and synchronising efforts with external agencies for multi-agency response. - **Knowledge:** Familiarity with joint incident response protocols, external agency roles, and coordination techniques. - **Behaviour:** Collaborative and efficient in managing multi-agency coordination to ensure seamless operational integration.	40% Theoretical 60% Practical
	6. Resource Tracking and Accountability	a. Monitors the status and location of all ARFFS resources (personnel, vehicles, equipment)	- **Skill:** Proficient in tracking and documenting the deployment and status of ARFFS resources in real time. - **Knowledge:** Understanding of resource	50% Theoretical 50% Practical

		during the incident. b. b. Ensures accurate tracking of deployed resources and maintains detailed records for post-incident review.	tracking systems, operational timelines, and accountability procedures. - **Behaviour:** Organised and detail-oriented in monitoring resources, ensuring accountability and proper documentation throughout the incident.	
	7. Incident Debriefing and Report Preparation	a. Participates in post-incident debriefings to provide insights on mobilisation and communication effectiveness. b. Prepares detailed reports on resource mobilisation, communications, and any challenges encountered.	- **Skill:** Competent in compiling incident reports that capture the mobilisation process, communication flows, and areas for improvement. - **Knowledge:** Familiarity with incident debriefing procedures, report structures, and key performance indicators. - **Behaviour:** Analytical and reflective in assessing performance	50% Theoretical 50% Practical

			, contributing to continuous improvement in incident response processes.	

Competency Unit 4: Don Personal Protective Equipment (PPE)				
This competency unit is designed to ensure ARFFS personnel possess the necessary skills, knowledge, and behaviours to properly use, maintain, and manage personal protective equipment (PPE). PPE is critical for safeguarding ARFFS personnel during emergency operations, and maintaining readiness through proper PPE management is essential for operational safety and effectiveness.				
Skill Development: This unit ensures that ARFFS personnel can competently select, inspect, maintain, and use PPE, ensuring their safety during routine and emergency operations, particularly in environments where hazardous materials or high temperatures are involved. **Behavioural Expectations:** Personnel are expected to demonstrate a high level of responsibility and discipline in the use and maintenance of PPE. Proactive management of PPE readiness, coupled with adherence to safety protocols, is essential for maintaining operational safety and effectiveness. **Assessment Ratio:** The emphasis on practical assessment recognises that hands-on proficiency in the use of PPE is critical to ARFFS operations. Theoretical knowledge provides a foundation for understanding the technical aspects and proper management of PPE, while practical assessments ensure personnel can apply this knowledge in real-world situations.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
4: Personal Protective Equipment (PPE)	1. PPE Selection and Usage	a. Selects and dons appropriate PPE based on the nature of the emergency (fire, hazardous materials, rescue, etc.). b. Ensures proper fit and functionality of all PPE items.	**Skill:** Ability to choose and wear the correct PPE based on the operational environment. **Knowledge:** Understanding of the types of PPE (fire-resistant clothing, helmets, gloves, boots, breathing	40% Theoretical 60% Practical

			apparatus) and their use. **Behaviour:** Diligent in ensuring correct PPE usage and fit before engagement.	
	2. PPE Inspection and Maintenance	a. Conducts regular and thorough inspections of all PPE before and after use. b. Identifies any damage or defects and initiates timely repair or replacement.	**Skill:** Proficient in inspecting PPE for wear, damage, or degradation. **Knowledge:** Knowledge of PPE lifespan, material properties, and inspection procedures. **Behaviour:** Proactive in maintaining PPE in a fully functional state.	30% Theoretical 70% Practical
	3. Proper Storage of PPE	a. Ensures PPE is stored correctly to prevent damage or contamination. b. Follows manufacturer and regulatory guidelines for PPE storage.	**Skill:** Ability to store PPE in a manner that ensures longevity and readiness. **Knowledge:** Understanding of storage conditions to preserve PPE effectiveness. **Behaviour:** Organised and methodical in PPE storage management.	50% Theoretical 50% Practical

Competency Unit 5: Operate ARFFS Appliances' Systems				
This competency unit is designed to ensure ARFFS personnel possess the necessary skills, knowledge, and behaviours to operate ARFFS appliances and their systems. The ability to operate these systems effectively is critical for timely and efficient response to aircraft emergencies.				
Skill Development: This unit focuses on ensuring that ARFFS personnel are fully competent in operating complex ARFFS appliances and their systems under various conditions. Operational readiness, as well as efficient coordination and deployment, are central to the effective management of emergencies. **Behavioural Expectations:** ARFFS personnel are expected to demonstrate responsibility, precision, and teamwork in operating ARFFS appliance systems, particularly during high-pressure emergency scenarios where coordination and clear communication are critical to successful outcomes. **Assessment Ratio:** The balance of theoretical and practical assessment reflects the need for both technical understanding and hands-on proficiency in operating ARFFS appliances. Practical assessments are emphasised, as real-world operation of these systems is critical during emergency response.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
5: Operate ARFFS Appliances' Systems	1. Pre-Operational Checks of ARFFS Appliances	a. Conducts thorough pre-operational checks on ARFFS appliances and systems. b. Identifies and reports any operational defects or maintenance issues before deployment.	**Skill:** Proficiency in performing detailed inspections of appliances, including engine, pump, and system checks. **Knowledge:** Understanding of ARFFS appliance systems and operational readiness protocols. **Behaviour:** Methodical and disciplined in pre-operational inspections.	40% Theoretical 60% Practical
	2. Operation of Fire	a. Operates water, foam, and dry	**Skill:** Proficient in operating and controlling	30% Theoretical 70% Practical

	Suppression Systems	chemical fire suppression systems in accordance with ARFFS protocols. b. Adjusts system output to match the type of fire and operational needs.	various fire suppression systems. **Knowledge:** Understanding of fire suppression principles and ARFFS protocols. **Behaviour:** Precise and adaptable in deploying fire suppression systems during emergencies.	
	3. Control of Pumping and Pressure Systems	a. Operates pumping systems, ensuring correct pressure is maintained for fire suppression activities. b. Troubleshoots basic issues related to pressure or flow rate.	**Skill:** Competent in operating pumps and managing pressure systems to meet the requirements of the emergency. **Knowledge:** Knowledge of water flow, pump mechanics, and pressure management. **Behaviour:** Focused and efficient in managing pumping systems under pressure.	40% Theoretical 60% Practical
	4. Post-Operational Maintenance of Systems	a. Conducts thorough post-operational checks and	**Skill:** Competent in performing detailed post-operation inspections	40% Theoretical 60% Practical

		maintenance of all ARFFS appliances and systems. b. Reports and addresses any system defects or required maintenance.	and maintenance. **Knowledge:** Understanding of system wear, post-operation checks, and required maintenance. **Behaviour:** Thorough and proactive in post-operational maintenance.	

Competency Unit 6: Operate ARFFS Appliances' Monitors/Turrets				
This competency unit ensures that ARFFS personnel possess the necessary skills, knowledge, and behaviours to operate ARFFS appliances' monitors/turrets efficiently during emergency response. The operation of monitors/turrets is critical for delivering precise and effective fire suppression and requires advanced technical knowledge, operational skill, and situational awareness in compliance with competency-based training and assessment requirements.				
Skill Development: This unit focuses on ensuring personnel are competent in operating and maintaining monitors/turrets in all conditions, including night operations, large-scale incidents, and varying fire scenarios. Adjusting flow rates, aiming, and using different fire suppression agents are key to operational success. **Behavioural Expectations:** Personnel are expected to exhibit high levels of focus, adaptability, and teamwork when operating monitors/turrets, especially in coordinated multi-appliance operations. Precision and calm under pressure are critical behavioural attributes. **Assessment Ratio:** A higher emphasis on practical assessment reflects the critical need for ARFFS personnel to demonstrate proficiency in hands-on operation of monitors/turrets during real-world emergency scenarios. Theoretical understanding provides a foundation for system functionality, while practical assessments ensure personnel can operate these systems effectively in dynamic environments.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
6: Operate ARFFS Appliances' Monitors / Turrets	1. Pre-Operational Checks of Monitors / Turrets	a. Conducts thorough pre-operational checks on monitors/turrets, ensuring no	**- Skill:** Proficient in inspecting monitors/turrets for defects, wear, or operational issues.	50% Theoretical 50% Practical

		defects or mechanical issues are present. b. Identifies and reports any operational concerns.	- **Knowledge:** Understanding of mechanical systems and pre-operational check procedures. - **Behaviour:** Attentive to detail during inspections.	
	2. Operate Monitors/Turrets for Fire Suppression	a. Operates monitors/turrets to deliver water, foam, or dry chemical agents effectively during firefighting operations. b. Adjusts flow rate and pattern as needed.	- **Skill:** Proficient in controlling monitors/turrets and adjusting output during various fire scenarios. - **Knowledge:** Understanding of fire suppression principles, including correct nozzle patterns and flow rates. - **Behaviour:** Focused and responsive during high-pressure firefighting scenarios.	40% Theoretical 60% Practical
	3. Monitor/Turret Positioning and Aim	a. Demonstrates correct positioning and aiming of monitors/turrets for optimal	- **Skill:** Accurate positioning and aiming of monitors/turrets for maximum fire suppression impact.	30% Theoretical 70% Practical

		fire suppression. b. Ensures consistent control of aim while considering wind and terrain.	- **Knowledge:** Knowledge of fire behaviour, wind effects, and terrain considerations. - **Behaviour:** Calm and precise in adjusting aim during operations.	
	4. Coordinated Operation of Multiple Monitors / Turrets	a. Works in coordination with other ARFFS team members to operate multiple monitors/turrets simultaneously. b. Ensures effective communication and operational synchronisation.	- **Skill:** Effective teamwork in operating multiple monitors/turrets simultaneously during large-scale operations. - **Knowledge:** Understanding of operational coordination techniques. - **Behaviour:** Collaborative and communicative in managing joint operations.	30% Theoretical 70% Practical
	5. Adjusting Monitors / Turrets for Different Agents	a. Selects and operates appropriate agent (water, foam, dry chemical) based on the fire type.	- **Skill:** Proficient in adjusting monitors/turrets for different fire suppression agents. - **Knowledge:** Knowledge of the characteristics of water,	40% Theoretical 60% Practical

		b. Adjusts monitors/turrets for effective delivery of the chosen agent.	foam, and dry chemicals and their application. - **Behaviour:** Decisive and adaptable when selecting and switching agents.	
	6. Monitor/Turret Control During Night and Low-Visibility Operations	a. Demonstrates control of monitors/turrets during night or low-visibility conditions. b. Uses lighting and other tools to maintain situational awareness during operation.	- **Skill:** Effective use of monitors/turrets in low-visibility conditions. - **Knowledge:** Understanding of low-visibility operational challenges and techniques. - **Behaviour:** Exhibits composure and precision in challenging conditions.	50% Theoretical 50% Practical
	7. Post-Operational Maintenance of Monitors / Turrets	a. Conducts post-operational inspections and maintenance on monitors/turrets. b. Ensures any operational defects are	- **Skill:** Ability to identify mechanical or operational issues during post-operation checks. - **Knowledge:** Understanding of maintenance procedures and system	40% Theoretical 60% Practical

		reported and addressed immediately.	performance requirements. - **Behaviour:** Methodical and responsible in post-operation maintenance.	

Competency Unit 7: Deploy and Operate ARFFS Firefighting Equipment				
This competency unit is designed to ensure ARFFS (Aircraft Rescue and Firefighting Services) personnel possess the required skills, knowledge, and behaviours to effectively deploy and operate firefighting equipment during emergency situations. This unit covers the operational readiness, use, and maintenance of essential firefighting tools and equipment to ensure a safe, efficient, and coordinated response.				
Skill Development: This unit focuses on developing the ability of ARFFS personnel to deploy, operate, and maintain firefighting equipment effectively during various emergency scenarios. Critical skills include hose management, extinguisher use, equipment coordination, and post-operation maintenance. **Behavioural Expectations:** Personnel are expected to demonstrate responsibility, precision, and teamwork during the deployment and operation of firefighting equipment. A proactive attitude towards equipment maintenance and readiness is essential for maintaining safety and operational effectiveness. **Assessment Ratio:** The balance between theoretical and practical assessment reflects the importance of understanding the technical aspects of firefighting equipment while ensuring personnel are proficient in their practical use during high-stress situations. Emphasis is placed on hands-on application to simulate real-world operations.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
7: Deploy and Operate ARFFS Firefighting Equipment	1. Pre-Deployment Inspection of Firefighting Equipment	a. Conducts thorough inspections of all firefighting equipment before deployment. b. Identifies and addresses	- Skill: Proficient in conducting pre-deployment checks of hoses, nozzles, axes, fire extinguishers, and other equipment. - **Knowledge:** Understanding	40% Theoretical 60% Practical

		defects or maintenance issues to ensure readiness for use.	equipment inspection procedures and operational standards. - **Behaviour:** Diligent and methodical in equipment inspections.	
	2. Correct Equipment Selection for Different Fire Scenarios	a. Selects appropriate firefighting equipment based on the type and scale of the fire. b. Demonstrates ability to adjust equipment selection as situations evolve.	- **Skill:** Competent in selecting the correct tools and equipment for various fire types (Class A, B, C, D, etc.). - **Knowledge:** Familiarity with fire classifications and corresponding firefighting methods. - **Behaviour:** Adaptable and decisive in selecting and using appropriate equipment.	40% Theoretical 60% Practical
	3. Hose Deployment and Management	a. Deploys and operates hoses efficiently, ensuring correct pressure, flow, and coverage. b. Manages hose lines effectively	- Skill: Proficient in deploying and managing hoses, maintaining correct pressure and flow. - **Knowledge:** Knowledge of hose handling, pressure	30% Theoretical 70% Practical

		to avoid entanglement or obstruction.	dynamics, and water flow. - **Behaviour:** Organised and focused in managing hose operations during firefighting.	
	4. Use of Firefighting Extinguishers and Hand Tools	a. Demonstrates correct use of extinguishers (water, foam, CO_2, dry chemical) and hand tools (axes, forcible entry tools). b. Adjusts methods based on fire intensity.	- **Skill:** Ability to operate portable fire extinguishers and hand tools effectively. - **Knowledge:** Familiarity with extinguisher types, hand tool functions, and their specific applications. - **Behaviour:** Precise and calm when using manual equipment under pressure.	40% Theoretical 60% Practical
	5. Coordination of Multiple Firefighting Equipment	a. Coordinates the simultaneous use of multiple firefighting tools and equipment during complex scenarios.	- **Skill:** Capable of deploying and managing multiple firefighting tools effectively. - **Knowledge:** Understanding how different firefighting tools and	30% Theoretical 70% Practical

		b. Ensures seamless integration of equipment with team operations.	equipment interact. - **Behaviour:** Collaborative and communicative in coordinating equipment use with other team members.	
	6. Firefighting Equipment Maintenance Post-Deployment	a. Conducts proper cleaning, inspection, and maintenance of equipment after each operation. b. Reports any damage or wear for immediate repair or replacement.	- **Skill**: Competent in performing post-operation maintenance and inspections on equipment. - **Knowledge**: Knowledge of maintenance procedures for hoses, nozzles, extinguishers, and hand tools. - **Behaviour**: Responsible and thorough in ensuring equipment readiness after each use.	50% Theoretical 50% Practical
	7. Firefighting Equipment Training and Drills	a. Participates in regular training drills involving firefighting equipment.	- **Skill**: Ability to maintain proficiency in equipment use through regular drills and exercises.	40% Theoretical 60% Practical

		b. Demonstrates continuous proficiency in deploying and operating various tools and system	- **Knowledge**: Awareness of current ARFFS standards and updates in firefighting technologies. - **Behaviour**: Committed to continuous learning and operational readiness.	

Competency Unit 8: Deploy & Operate ARFFS Primary and Secondary Extinguishing Media Units				
This competency unit addresses the skills, knowledge, and behaviours required for ARFFS (Aircraft Rescue and Firefighting Services) personnel to deploy and operate primary and secondary extinguishing media units effectively during emergency operations. This unit focuses on the operational use of extinguishing media, including water, foam, and dry chemicals, to ensure effective fire suppression and incident response.				
Skill Development: This unit focuses on enhancing the ability of ARFFS personnel to deploy both primary and secondary extinguishing media during emergency responses. Proficiency in the selection, operation, and coordination of extinguishing agents is critical to successful firefighting outcomes. **Behavioural Expectations**: Personnel are expected to demonstrate responsibility, adaptability, and precision when selecting and operating extinguishing media units. Ensuring operational readiness and effectively integrating multiple media types are key behavioural attributes for successful incident management. **Assessment Ratio**: The balance of theoretical and practical assessment reflects the need for a strong understanding of extinguishing media characteristics (theoretical) and the ability to apply them effectively in real-world firefighting scenarios (practical). Practical assessments are prioritised to ensure personnel can deploy and operate extinguishing media with precision.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
8: Deploy & Operate ARFFS Primary and Secondary Extinguishing Media Units	1. Pre-Deployment Inspection of Extinguishing Media Units	a. Conducts thorough pre-deployment inspections of all	- **Skill**: Proficiency in inspecting extinguishing media units (water, foam, dry chemicals) for operational	50% Theoretical 50% Practical

		primary and secondary extinguishing media units. b. Identifies and reports any defects, ensuring units are operationally ready.	readiness. - **Knowledge**: Understanding of inspection protocols, unit components, and media storage requirements. - **Behaviour**: Diligent and methodical in pre-deployment checks to ensure effectiveness during operations.	
	2. Selection of Primary Extinguishing Media	a. Selects appropriate primary extinguishing media (water, foam) based on fire type and intensity. b. Adjusts the concentration and flow of media based on operational needs.	- **Skill**: Competent in selecting and deploying water or foam for specific fire situations (Class A, B fires). - **Knowledge**: Detailed understanding of fire behaviour and extinguishing properties of water and foam. - **Behaviour**: Decisive and adaptable in adjusting media flow and concentratio	40% Theoretical 60% Practical

			n for optimal suppression.	
	3. Operation of Primary Extinguishing Media Units	a. Operates water and foam units effectively, ensuring consistent pressure and flow. b. Controls application of primary extinguishing media to suppress the fire efficiently.	- **Skill**: Proficient in operating water and foam units, adjusting flow rates and pressure for fire suppression. - **Knowledge**: Understanding of foam types, water dynamics, and their behaviour under various fire conditions. - **Behaviour**: Precise and controlled in media application to achieve maximum fire suppression effect.	40% Theoretical 60% Practical
	4. Selection and Use of Secondary Extinguishing Media	a. Selects appropriate secondary extinguishing media (dry chemical, CO_2) for supplementary fire control. b. Deploys secondary	- **Skill**: Proficient in identifying when to deploy secondary media like dry chemical or CO_2 to tackle specific fire types (Class B, C, D fires). - **Knowledge**: Familiarity with secondary media properties,	40% Theoretical 60% Practical

		media to complement primary extinguishing efforts.	including fire suppression, cooling, and re-ignition prevention. - **Behaviour**: Quick and strategic in deploying secondary extinguishing media for comprehensive fire control.	
	5. Integrated Use of Primary and Secondary Media	a. Coordinates the use of primary and secondary extinguishing media for effective fire control. b. Ensures correct sequencing and timing of media deployment for maximum efficiency.	- **Skill**: Competent in deploying primary and secondary media in a complementary manner, balancing water/foam and chemical agents. - **Knowledge**: Understanding of how extinguishing media interact and their combined effects. - **Behaviour**: Collaborative and focused on the synchronised application of multiple media.	30% Theoretical 70% Practical
	6. Application Techniques Under Varying Conditions	a. Demonstrates proficiency in using	- **Skill**: Effective use of extinguishing media in varied environment	40% Theoretical 60% Practical

		extinguishing media under different weather, terrain, and environmental conditions. b. Adjusts techniques based on wind, temperature, and hazards.	al conditions, such as high winds or confined areas. - **Knowledge**: Awareness of environmental factors and their impact on media performance. - **Behaviour**: Adaptive and resourceful when applying techniques in challenging conditions.	
	7. Post-Operational Maintenance and Replenishment	a. Ensures extinguishing media units are replenished and fully operational after deployment. b. Conducts post-operational checks and maintenance on all units.	- **Skill**: Proficient in replenishing media units (water, foam, dry chemical) and conducting post-operation maintenance. - **Knowledge**: Understanding of maintenance protocols for extinguishing media units and associated systems. - **Behaviour**: Thorough and	50% Theoretical 50% Practical

			responsible in post-operational maintenance and ensuring readiness for future use.	
	8. Continuous Training and Proficiency in Media Use	a. Participates in regular training exercises to maintain proficiency in deploying and operating extinguishing media units. b. Stays updated on new technologies and media types.	- **Skill**: Maintains competency in the use of extinguishing media through continuous training and drills. - **Knowledge**: Awareness of emerging technologies and best practices for firefighting media. - **Behaviour**: Committed to continuous learning and operational excellence in extinguishing media deployment.	40% Theoretical 60% Practical

Competency Unit 9: Select & Operate ARFFS Rescue Equipment
This competency unit is designed to ensure ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the necessary skills, knowledge, and behaviours to select and operate rescue equipment effectively during emergency situations. This unit covers the deployment and use of essential rescue tools, ensuring that personnel can carry out complex rescues safely and efficiently.
Skill Development: This unit is designed to enhance ARFFS personnel's ability to select and operate a wide range of rescue tools, ensuring they can respond quickly and effectively to various emergency situations. Skills in tool selection, operation, coordination, and post-operation maintenance are prioritised.

Behavioural Expectations: Personnel are expected to demonstrate precision, adaptability, and safety-conscious behaviour when selecting and operating rescue equipment. Teamwork, particularly in multi-agency environments, and a commitment to maintaining operational readiness through continuous training, are also critical.

Assessment Ratio: The practical component of the assessment is emphasised, reflecting the critical need for ARFFS personnel to be proficient in the hands-on deployment and operation of rescue equipment in real-world emergency scenarios. Theoretical understanding of equipment mechanics, capabilities, and protocols underpins the practical application.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
9: Select & Operate ARFFS Rescue Equipment	1. Pre-Operational Inspection of Rescue Equipment	a. Conducts thorough pre-operational checks of all rescue equipment. b. Identifies and addresses defects or maintenance issues to ensure equipment is ready for use.	- **Skill**: Proficient in inspecting rescue equipment (cutters, spreaders, hydraulic tools, ropes) for operational readiness. - **Knowledge**: Understanding of equipment components and maintenance protocols. - **Behaviour**: Diligent and systematic in equipment inspections to ensure safety and reliability during operations.	50% Theoretical 50% Practical
	2. Selection of Appropriate Rescue Equipment	a. Selects appropriate rescue equipment based on the nature and	- **Skill**: Competent in selecting the correct rescue tools (hydraulic tools, saws, jacks) based on the scenario, such as	40% Theoretical 60% Practical

		scale of the emergency. b. Demonstrates flexibility in equipment choice as the situation evolves.	entrapment or structural collapse. - **Knowledge**: Familiarity with various types of rescue equipment and their applications. - **Behaviour**: Decisive and adaptable when selecting equipment based on evolving rescue needs.	
	3. Operation of Hydraulic and Powered Rescue Tools	a. Operates hydraulic rescue tools (cutters, spreaders) effectively for extrication and rescue. b. Adjusts tool usage according to material strength and rescue objectives.	- **Skill**: Proficient in using hydraulic and powered rescue tools under varied conditions. - **Knowledge**: Understanding tool mechanics, pressure requirements, and safety precautions. - **Behaviour**: Precise and controlled in the use of powered tools to minimise harm to victims and prevent further structural damage.	40% Theoretical 60% Practical

	4. Manual Rescue Tools Operation	a. Demonstrates correct use of manual rescue tools (axes, jacks, pry bars) for access and extrication. b. Maintains safety and efficiency when operating in confined spaces or difficult terrains.	- **Skill**: Effective use of manual rescue tools in confined and high-stress environments. - **Knowledge**: Knowledge of tool capabilities, techniques, and limitations. - **Behaviour**: Calm and methodical under pressure, ensuring safe operations when using manual tools.	40% Theoretical 60% Practical
	5. Rope and Technical Rescue Equipment	a. Utilises rope systems and technical rescue equipment for height and confined space rescues. b. Ensures proper rigging and safety procedures are followed.	- **Skill**: Competent in setting up and operating rope systems for technical rescue situations. - **Knowledge**: Understanding of knots, anchors, and rigging techniques for height and confined space rescues. - **Behaviour**: Safety-conscious and detail-oriented in technical rescue	50% Theoretical 50% Practical

			operations, ensuring all rigging meets safety standards.	
	6. Post-Operational Maintenance of Rescue Equipment	a. Coordinates the use of ARFFS rescue equipment with other emergency services (EMS, police) during multi-agency operations. b. Ensures clear communication and task sharing.	- **Skill**: Proficient in coordinating equipment deployment with other agencies during complex rescue scenarios. - **Knowledge**: Familiarity with multi-agency protocols and communication strategies. - **Behaviour**: Collaborative and communicative, ensuring efficient and safe equipment use within a multi-agency framework.	50% Theoretical 50% Practical
	7. Post-Operational Maintenance of Rescue Equipment	a. Conducts post-operational checks and maintenance on rescue tools and equipment. b. Replenishes and restores equipment	- **Skill**: Proficient in cleaning, inspecting, and maintaining rescue equipment after operations. - **Knowledge**: Understanding of maintenance protocols and equipment lifespan.	50% Theoretical 50% Practical

		for future use, reporting any damage or defects.	- **Behaviour**: Responsible and thorough in ensuring all equipment is fully operational after use, with any defects reported for repair.	
	8. Continuous Training and Equipment Proficiency	a. Regularly participates in drills and exercises involving rescue equipment. b. Maintains proficiency in operating new or updated rescue tools and techniques.	- **Skill**: Maintains high levels of proficiency in equipment use through regular training. - **Knowledge**: Awareness of advances in rescue equipment technologies and updates in operational procedures. - **Behaviour**: Committed to continuous learning and improvement in rescue equipment handling and application.	40% Theoretical 60% Practical

Competency Unit 10: Deploy & Climb ARFFS Ladders
This competency unit addresses the essential skills, knowledge, and behaviours required by ARFFS (Aircraft Rescue and Firefighting Services) personnel to safely and effectively deploy and climb ladders during emergency operations. The unit ensures personnel are proficient in ladder handling techniques, situational awareness, and the ability to operate in challenging environments.
Skill Development: This unit focuses on ensuring that ARFFS personnel are proficient in ladder deployment, climbing techniques, and the safe use of ladders during rescue operations. Personnel are expected to handle ladders in varied and challenging environments, including poor visibility and unstable surfaces.

Behavioural Expectations: Personnel are expected to demonstrate responsibility, safety-consciousness, and adaptability when deploying and using ladders. Precision, teamwork, and adherence to safety protocols are critical behaviours for successful ladder operations.

Assessment Ratio: A strong emphasis on practical assessment reflects the critical nature of ladder deployment and climbing in ARFFS operations, where personnel should demonstrate proficiency in hands-on techniques under real-world conditions. Theoretical understanding ensures personnel are aware of safety protocols and equipment limitations.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
10: Deploy & Climb ARFFS Ladders	1. Pre-Deployment Inspection of Ladders	a. Conducts thorough pre-deployment inspections of ladders for defects or damage. b. Ensures ladders are operationally ready for deployment.	- **Skill**: Ability to inspect ladders for structural integrity, checking for cracks, bends, or loose components. - **Knowledge**: Familiarity with ladder inspection procedures and manufacturer's safety guidelines. - **Behaviour**: Methodical and responsible in ensuring ladders are fit for use.	50% Theoretical 50% Practical
	2. Ladder Deployment Techniques	a. Demonstrates correct ladder deployment, considering angle, stability, and safety of personnel.	- **Skill**: Proficient in deploying ladders, ensuring proper positioning and securing. - **Knowledge**: Understanding of appropriate ladder angles, footing techniques,	40% Theoretical 60% Practical

		b. Ensures ladders are secured against slippage or instability.	and stabilisation methods. - **Behaviour**: Calm and precise in ladder deployment, maintaining focus on safety and efficiency.	
	3. Climbing Techniques and Safety	a. Demonstrates proper climbing techniques, maintaining three points of contact at all times. b. Utilises safety harnesses or equipment as required in high-risk situations.	- **Skill**: Proficient in ascending and descending ladders safely, maintaining balance and control. - **Knowledge**: Knowledge of safe climbing practices, including maintaining body posture and weight distribution. - **Behaviour**: Disciplined in adhering to safety protocols, demonstrating self-awareness while climbing.	30% Theoretical 70% Practical
	4. Ladder Use in Rescue Operations	a. Deploys ladders for rescue operations, ensuring stability and safety for	- **Skill**: Competent in positioning and using ladders to assist in rescue operations, ensuring the safety of personnel and victims. - **Knowledge**:	40% Theoretical 60% Practical

		both rescuers and victims. b. Coordinates ladder use with team members to facilitate rescue.	Awareness of ladder load limits and strategies for safe victim movement. - **Behaviour**: Collaborative in managing ladder deployment with team members, prioritising the safety of all parties involved.	
	5. Ladder Use in High and Low Visibility Conditions	a. Demonstrates proficiency in deploying and climbing ladders under challenging conditions, such as low visibility or night-time operations. b. Uses appropriate lighting or visual aids to enhance safety.	- **Skill**: Proficient in adapting climbing techniques to different environmental conditions, including poor visibility and adverse weather. - **Knowledge**: Understanding of the risks associated with low-visibility operations and the use of lighting equipment. - **Behaviour**: Adaptive and cautious when operating in challenging environments, ensuring that safety is not compromised.	50% Theoretical 50% Practical

	6. Ladder Retrieval and Post-Operation Checks	a. Safely retrieves and stores ladders following operational use. b. Conducts post-operation inspections for wear, damage, or needed repairs, ensuring readiness for future use.	- **Skill**: Proficient in ladder retrieval, ensuring that it is safely stowed and secured. - **Knowledge**: Familiarity with post-use maintenance protocols to ensure ladder readiness. - **Behaviour**: Responsible and detail-oriented in post-operation checks, ensuring equipment is operational for subsequent use.	50% Theoretical 50% Practical
	7. Training and Proficiency in Ladder Operations	a. Participates in regular ladder deployment and climbing drills to maintain proficiency. b. Stays updated on best practices and safety protocols related to ladder operations.	- **Skill**: Competent in maintaining operational readiness through regular drills and continuous skill development. - **Knowledge**: Awareness of updated ladder safety standards and best practices. - **Behaviour**: Committed to continuous learning and skill enhancement	40% Theoretical 60% Practical

			in ladder operations.	

Competency Unit 11: Don and Operate in Breathing Apparatus (BA)				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the essential skills, knowledge, and behaviours required to don and operate in breathing apparatus (BA) during firefighting and rescue operations. This unit focuses on the correct use, maintenance, and operation of breathing apparatus, ensuring personnel can function safely and effectively in hazardous environments.				
Skill Development: This unit is designed to enhance the operational effectiveness of ARFFS personnel in using breathing apparatus under various conditions, focusing on the proper use, maintenance, and troubleshooting of BA units. Skills in emergency procedures, air management, and operating in hazardous environments are prioritised. **Behavioural Expectations**: Personnel are expected to demonstrate calm, precise, and safety-conscious behaviour while donning and operating in BA. Composure in hazardous situations, teamwork, and attention to detail in post-use maintenance are key behavioural attributes. **Assessment Ratio**: The practical assessment is heavily weighted, given the critical nature of operating in BA during live emergency situations. Theoretical understanding ensures that personnel are familiar with safety protocols, equipment limitations, and proper usage techniques, while practical assessments verify the ability to apply this knowledge in high-risk environments.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
11: Don and Operate in Breathing Apparatus (BA)	1. Pre-Use Inspection of Breathing Apparatus (BA)	a. Conducts a thorough pre-use inspection of all breathing apparatus components (cylinder, harness, mask, valves). b. Ensures that the BA is fully charged and operationally ready.	- **Skill**: Ability to perform detailed inspections, checking for any defects or operational issues in the BA unit. - **Knowledge**: Understanding of BA components, including air supply systems, harness fittings, and safety features. - **Behaviour**: Methodical and responsible in conducting inspections to ensure safe operation.	50% Theoretical 50% Practical

	2. Donning the Breathing Apparatus (BA)	a. Demonstrates the ability to don the BA correctly and efficiently within the recommended time. b. Ensures all connections are secure, and mask fit is airtight.	- **Skill**: Proficient in donning BA, ensuring a secure fit of the harness, mask, and regulator. - **Knowledge**: Awareness of time-critical donning procedures and mask seal verification. - **Behaviour**: Calm, efficient, and precise in donning the BA under both routine and emergency conditions.	40% Theoretical 60% Practical
	3. Operating with BA Under Normal Conditions	a. Operates safely and effectively with BA in routine training scenarios. b. Monitors air supply and adjusts operational movements to ensure optimal use of BA.	- **Skill**: Proficient in manoeuvring and performing operational tasks while wearing BA. - **Knowledge**: Familiarity with air management, breathing techniques, and BA endurance limits. - **Behaviour**: Controlled and aware of air consumption rates, maintaining operational effectiveness.	40% Theoretical 60% Practical
	4. Operating with BA in Hazardous Conditions	a. Operates safely in high-stress, hazardous conditions while	- **Skill**: Capable of navigating hazardous environments, maintaining composure and	30% Theoretical 70% Practical

		wearing BA (e.g., smoke, fire, toxic atmospheres). b. Demonstrates effective decision-making and adaptability under pressure.	task focus while wearing BA. - **Knowledge**: Understanding of the risks of toxic atmospheres and techniques for safe operation in these environments. - **Behaviour**: Composed, decisive, and safety-conscious when operating in life-threatening conditions.	
	5. Emergency Procedures and BA Failure Protocols	a. Demonstrates proper use of BA emergency procedures (e.g., air management during low air alarms, switching to backup systems). b. Handles BA malfunctions effectively and safely.	- **Skill**: Proficient in responding to BA failures and initiating emergency procedures (e.g., low air alarms, buddy breathing, or rapid escape techniques). - **Knowledge**: Familiarity with BA emergency protocols and equipment limitations. - **Behaviour**: Composed and responsive under pressure, ensuring personal and team safety during BA malfunctions.	40% Theoretical 60% Practical
	6. BA Command and Control	a. Coordinates and commands	- **Skill**: Proficient in leading BA teams,	40% Theoretical 60% Practical

	in Team Operations	BA team operations, ensuring safe deployment, accountability, and air supply monitoring for all team members. b. Manages communication and control between BA entry teams and the command post.	monitoring air supply, ensuring team safety, and making critical decisions under pressure. - **Knowledge**: Understanding command and control procedures, including BA entry control and air management systems. - **Behaviour**: Displays strong leadership, clear communication, and situational awareness in managing BA teams.	
	7. Post-Use Cleaning and Maintenance of BA	a. Performs proper cleaning and decontamination of BA after use, ensuring all parts are sanitised. b. Conducts post-use inspections to identify any damage or wear, initiating necessary repairs.	- **Skill**: Competent in cleaning and maintaining BA components after use, ensuring the unit is fully operational for future deployments. - **Knowledge**: Knowledge of maintenance protocols, including checks for valve functionality, mask integrity, and cylinder refill procedures. - **Behaviour**: Thorough and	50% Theoretical 50% Practical

			responsible in post-use maintenance, ensuring the equipment is operationally ready.	
	8. Continuous Training and Proficiency with BA	a. Participates in regular BA drills and simulations to maintain proficiency in donning, operating, and troubleshooting BA. b. Stays updated on new BA technologies and best practices.	- **Skill**: Demonstrates consistent proficiency in BA operation through continuous training and exercises. - **Knowledge**: Awareness of emerging BA technologies, updates to safety standards, and best practices for operational use. - **Behaviour**: Committed to continuous learning and operational excellence in BA use.	40% Theoretical 60% Practical

Competency Unit 12: Drive, Operate, and Position ARFFS Appliances at Incidents
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in driving, operating, and positioning ARFFS appliances during emergency incidents. This unit focuses on safe driving techniques, operational readiness of appliances, and strategic positioning to ensure efficient and effective firefighting and rescue operations.
Skill Development: This unit focuses on ensuring ARFFS personnel are fully competent in the safe driving, operation, and strategic positioning of appliances during incidents. The development of critical skills in fire suppression system operation, emergency response driving, and appliance coordination are central to this competency. **Behavioural Expectations**: Personnel are expected to demonstrate composure, situational awareness, and decisive action while driving, operating, and positioning ARFFS appliances. Strong communication, teamwork, and attention to safety protocols are essential for successful incident response. **Assessment Ratio**: The emphasis on practical assessment reflects the need for ARFFS personnel to demonstrate proficiency in driving, operating, and positioning appliances in dynamic, high-stress environments.

	Theoretical understanding supports the operational skills, ensuring personnel can make informed decisions during deployment.			
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
12: Drive, Operate, and Position ARFFS Appliances at Incidents	1. Pre-Operational Checks of ARFFS Appliances	a. Conducts thorough pre-operational checks on all systems of the ARFFS appliance (engine, pumps, hoses, communication systems). b. Ensures the appliance is fully operational and equipped for immediate response.	- **Skill**: Proficient in conducting detailed inspections of critical systems to identify any potential malfunctions. - **Knowledge**: Awareness of pre-operational protocols, system functions, and equipment requirements. - **Behaviour**: Meticulous in ensuring that the appliance is fully operational before deployment.	50% Theoretical 50% Practical
	2. Driving Techniques for ARFFS Appliances	a. Demonstrates safe and efficient driving techniques for ARFFS appliances in both routine and emergency conditions. b. Adjusts driving methods based on terrain,	- **Skill**: Proficient in driving ARFFS vehicles, considering the size, weight, and speed of the appliance. - **Knowledge**: Understanding of vehicle handling dynamics, braking, and acceleration in various conditions. - **Behaviour**: Calm and	40% Theoretical 60% Practical

		weather, and road conditions.	composed, ensuring safety while maintaining rapid response times.	
	3. Emergency Response Driving	a. Demonstrates ability to drive ARFFS appliances in emergency situations, maintaining control while responding rapidly. b. Utilises emergency lights, sirens, and other warning systems appropriately.	- **Skill**: Capable of responding quickly while adhering to safety protocols for emergency driving. - **Knowledge**: Familiarity with emergency driving laws, appliance limitations, and safety considerations. - **Behaviour**: Focused and disciplined in maintaining control of the vehicle during high-pressure emergency responses.	30% Theoretical 70% Practical
	4. Positioning the ARFFS Appliance at Incidents	a. Positions the appliance strategically based on fire type, wind direction, aircraft location, and operational needs. b. Ensures accessibility for	- **Skill**: Proficient in assessing the incident scene and positioning the appliance to maximise firefighting and rescue effectiveness. - **Knowledge**: Understanding fire dynamics, wind effects, and the tactical use of appliances in incident response.	30% Theoretical 70% Practical

		other responding units and the safety of the crew.	- **Behaviour**: Decisive and strategic in positioning the appliance to ensure operational efficiency and safety.	
	5. Operation of Fire Suppression Systems	a. Operates water, foam, and dry chemical systems effectively from the ARFFS appliance during firefighting operations. b. Adjusts flow rates and pressure based on fire conditions.	- **Skill**: Competent in deploying fire suppression systems from the appliance, adjusting controls for optimal output. - **Knowledge**: Detailed understanding of fire suppression principles, media types, and system functionality. - **Behaviour**: Focused and efficient in operating fire suppression systems during dynamic fire scenarios.	40% Theoretical 60% Practical
	6. Managing Communication Systems	a. Utilises onboard communication systems to maintain clear contact with incident command and ARFFS team members.	- **Skill**: Proficient in operating communication equipment, maintaining continuous contact with the command structure. - **Knowledge**: Awareness of communication protocols, systems operation, and	40% Theoretical 60% Practical

		b. Ensures communication systems are fully operational during deployment.	troubleshooting. - **Behaviour**: Clear and concise in communicating with all relevant personnel during operations.	
	7. Coordinating Appliance Operations with Other Units	a. Demonstrates ability to work effectively with other ARFFS units, ensuring coordinated appliance operations. b. Ensures seamless integration of multiple appliances for large-scale incidents.	- **Skill**: Capable of coordinating the operation of multiple appliances and their systems for complex incidents. - **Knowledge**: Understanding of the roles and functions of various ARFFS appliances during major incidents. - **Behaviour**: Collaborative and communicative in managing joint operations with other teams.	40% Theoretical 60% Practical
	8. Post-Incident Shutdown and Maintenance	a. Conducts post-incident shutdown procedures, ensuring all systems are properly deactivated. b. Performs post-incident	- **Skill**: Proficient in following shutdown protocols and conducting detailed post-incident inspections of the appliance. - **Knowledge**: Familiarity with maintenance procedures to ensure the appliance is	50% Theoretical 50% Practical

		inspections and reports any necessary repairs or maintenance.	operationally ready for the next deployment. - **Behaviour**: Responsible and thorough in ensuring the appliance is properly maintained and ready for future use.	

Competency Unit 13: Response to Aircraft Emergencies at Aerodromes				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in responding to aircraft emergencies at aerodromes, including aircraft crashes, fires, emergency landings, and other critical incidents involving aircraft. This unit covers incident assessment, firefighting and rescue operations, coordination with aviation authorities, and the implementation of emergency response procedures to ensure the safety of passengers, crew, and airport operations.				
Skill Development: This unit develops critical skills in incident assessment, fire suppression, rescue operations, and coordination with emergency services. Personnel are trained to respond to aircraft emergencies with efficiency and precision, ensuring the safety of passengers, crew, and airport operations. **Behavioural Expectations**: Personnel are expected to demonstrate strong leadership, effective communication, and adaptability in managing high-pressure situations involving aircraft emergencies. A focus on safety, coordination, and continuous improvement is essential for successful operations. **Assessment Ratio**: This unit emphasises practical application, with theoretical assessments focusing on the understanding of aircraft systems, emergency scenarios, and ICAO regulations. Practical assessments cover fire suppression, rescue operations, and incident command, ensuring personnel are prepared to manage real-world aircraft emergencies effectively.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
13: Response to Aircraft Emergencies at Aerodromes	1. Understand Different Aircraft Emergency Scenarios	a. Demonstrates comprehensive knowledge of various aircraft emergency scenarios, including engine fires, gear malfunctions, and full or partial evacuations. b. Identifies the potential risks and hazards	- **Skill**: Proficient in recognising different types of aircraft emergencies and understanding their implications for response operations. - **Knowledge**: Familiarity with ICAO regulations, aircraft	70% Theoretical 30% Practical

		associated with each type of aircraft emergency.	systems, and emergency procedures. - **Behaviour**: Vigilant and analytical, ensuring preparedness to respond to a variety of aircraft emergencies.	
	2. Initial Response and Incident Size-Up	a. Conducts a rapid and accurate size-up of the aircraft emergency, assessing factors such as the type of aircraft, location, fire potential, and presence of hazardous materials. b. Establishes immediate priorities for response, including fire suppression, rescue, and hazard containment.	- **Skill**: Competent in performing an initial size-up to guide the response strategy effectively. - **Knowledge**: Understanding of critical factors in size-up, including aircraft type, fuel load, and potential hazards. - **Behaviour**: Decisive and systematic, ensuring a clear initial assessment to inform response operations.	60% Theoretical 40% Practical
	3. Fire Suppression and Rescue Operations	a. Utilises appropriate fire suppression techniques and media (e.g., foam, dry chemical, water) based on the type and severity of the aircraft fire. b.	- **Skill**: Proficient in fire suppression and rescue operations specific to aircraft emergencies, ensuring effective use of resources. - **Knowledge**: Familiarity with	50% Theoretical 50% Practical

		Demonstrates proficiency in aircraft rescue operations, including accessing and extracting passengers and crew safely.	aircraft construction, access points, and rescue procedures. - **Behaviour**: Safety-conscious and efficient, ensuring that fire suppression and rescue efforts are prioritised based on the situation.	
	4. Coordination with Air Traffic Control and Other Emergency Services	a. Establishes and maintains effective communication with air traffic control (ATC) and other emergency services throughout the response. b. Ensures that information regarding the incident, response actions, and coordination requirements is shared accurately and in a timely manner.	- **Skill**: Proficient in managing communication and coordination with ATC and emergency services during aircraft emergencies. - **Knowledge**: Understanding of communication protocols and the roles of different agencies in aircraft emergency responses. - **Behaviour**: Collaborative and clear in communication, ensuring that all involved parties are well-coordinated and informed.	50% Theoretical 50% Practical
	5. Incident Command and Control during	a. Establishes and maintains incident	- **Skill**: Competent in leading and managing the	50% Theoretical 50% Practical

	Aircraft Emergencies	command, ensuring clear leadership and coordination of all response activities. b. Adapts the command structure as needed to address the evolving nature of the incident and the involvement of multiple agencies.	response to aircraft emergencies, ensuring effective incident command and control. - **Knowledge**: Familiarity with command and control principles and the coordination of multi-agency responses. - **Behaviour**: Decisive and adaptable, ensuring that the command structure supports efficient and effective response operations.	
	6. Management of Passengers and Crew During Evacuation	a. Ensures the safe and orderly evacuation of passengers and crew from the aircraft, prioritising life safety and minimising panic. b. Coordinates with cabin crew and other responders to assist with evacuation and provide first aid as necessary.	- **Skill**: Proficient in managing evacuations under emergency conditions, ensuring the safety of all individuals on board. - **Knowledge**: Understanding of evacuation procedures, aircraft layout, and the roles of cabin crew during emergencies. - **Behaviour**: Calm and	40% Theoretical 60% Practical

			authoritative, ensuring that evacuations are conducted smoothly and safely.	
	7. Hazard Containment and Environmental Protection	a. Identifies and mitigates secondary hazards, such as fuel spills, hazardous materials, or damaged aircraft components, to prevent further escalation of the incident. b. Implements environmental protection measures to minimise the impact of the incident on the surrounding area.	- **Skill**: Competent in hazard identification and containment to ensure the safety of responders and the environment. - **Knowledge**: Familiarity with hazardous materials response, spill containment, and environmental protection protocols. - **Behaviour**: Proactive and safety-focused, ensuring that hazards are managed effectively to prevent additional risks.	50% Theoretical 50% Practical
	8. Use of Aircraft Rescue and Firefighting Equipment	a. Demonstrates proficiency in the use of specialised ARFFS equipment, including rapid intervention vehicles, aircraft ladders, cutting tools, and fire suppression systems.	- **Skill**: Proficient in the use of ARFFS equipment, ensuring the safety and efficiency of operations during aircraft emergencies. - **Knowledge**: Understanding of the capabilities, limitations, and	40% Theoretical 60% Practical

		b. Ensures that all equipment is operated safely and effectively according to the manufacturer's guidelines and operational protocols.	operational procedures for ARFFS equipment. - **Behaviour**: Confident and precise in using equipment, ensuring that all actions are conducted safely and effectively.	
	9. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to review the effectiveness of the response to the aircraft emergency. b. Identifies lessons learned and integrates them into future training and operational procedures to improve response readiness.	- **Skill**: Competent in reviewing and analysing the response to aircraft emergencies, identifying areas for improvement. - **Knowledge**: Familiarity with debriefing techniques and how to apply lessons learned to enhance future responses. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that the response to future aircraft emergencies is optimised.	50% Theoretical 50% Practical

Competency Unit 14: Response to Aircraft Emergencies Outside Aerodromes
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in responding to aircraft emergencies occurring outside aerodromes, including crashes, forced landings, and emergency diversions. This unit covers the unique challenges of responding to incidents in remote or difficult-to-access areas, coordination with external agencies, and the implementation of effective rescue and firefighting strategies to protect lives and property.

Skill Development: This unit develops essential skills in incident assessment, navigation, multi-agency coordination, and the use of specialised equipment in remote environments. Personnel are trained to manage complex incidents that occur outside of aerodromes, ensuring the safety of passengers, crew, and responders.

Behavioural Expectations: Personnel are expected to demonstrate strong leadership, adaptability, and effective communication in challenging environments. A proactive approach to safety and coordination is critical for managing off-aerodrome aircraft emergencies successfully.

Assessment Ratio: This unit balances theoretical understanding of ICAO guidelines, terrain challenges, and emergency response protocols with practical application in real-world scenarios. Theoretical assessments focus on understanding the regulatory framework and response planning, while practical assessments cover navigation, incident command, and multi-agency coordination.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
14: Response to Aircraft Emergencies Outside Aerodromes	1. Understanding the Scope and Challenges of Off-Aerodrome Aircraft Emergencies	a. Demonstrates comprehensive knowledge of the types of aircraft emergencies that can occur outside aerodromes, such as crashes in remote areas, emergency landings, and diversions. b. Identifies the unique challenges associated with responding to off-aerodrome incidents, including access, communication, and coordination with external agencies.	- **Skill**: Proficient in recognising the challenges posed by off-aerodrome emergencies and planning responses accordingly. - **Knowledge**: Familiarity with ICAO and national guidelines for off-aerodrome responses, including safety protocols and coordination requirements. - **Behaviour**: Vigilant and strategic, ensuring readiness to respond to diverse and complex off-aerodrome scenarios.	70% Theoretical 30% Practical
	2. Initial Response and Incident Size-Up in Remote Locations	a. Conducts a rapid and accurate initial assessment of the off-aerodrome	- **Skill**: Competent in performing an initial size-up under challenging conditions,	60% Theoretical 40% Practical

		incident, evaluating factors such as aircraft type, location, weather conditions, terrain and accessibility. b. Establishes immediate priorities for response, including life-saving interventions, hazard containment, and site security.	ensuring that all critical factors are considered. - **Knowledge**: Understanding of size-up techniques in remote or difficult environments, including navigation, weather, and terrain considerations. - **Behaviour**: Decisive and methodical, ensuring that initial assessments guide effective response strategies.	
	3. Accessing and Navigating Remote or Difficult Terrain	a. Utilises appropriate vehicles, equipment, and techniques to access remote or challenging locations safely and efficiently. b. Demonstrates proficiency in navigating difficult terrain, ensuring that personnel and equipment reach the incident site without delay.	- **Skill**: Proficient in using all-terrain vehicles, air support, and navigation tools to reach remote incident sites. - **Knowledge**: Familiarity with navigation methods, vehicle limitations, and the use of specialised equipment for accessing difficult locations. - **Behaviour**: Resourceful and safety-conscious, ensuring that access is	50% Theoretical 50% Practical

			achieved safely and efficiently despite environmental challenges.	
	4. Coordination with External Agencies and Local Authorities	a. Establishes effective communication and coordination with local emergency services, law enforcement, and other relevant authorities during off-aerodrome responses. b. Ensures that roles and responsibilities are clearly defined and that all agencies work collaboratively to achieve a unified response.	- **Skill**: Proficient in managing multi-agency coordination, ensuring that all involved parties are aligned and working towards common goals. - **Knowledge**: Understanding of the roles of different agencies and the protocols for establishing command and control in off-aerodrome situations. - **Behaviour**: Collaborative and communicative, ensuring effective coordination and integration with external agencies.	50% Theoretical 50% Practical
	5. Incident Command and Control in Off-Aerodrome Environments	a. Establishes and maintains incident command, adapting the command structure to suit the complexities of the off-aerodrome environment.	- **Skill**: Competent in leading and managing the response to aircraft emergencies in remote locations, ensuring effective incident command. - **Knowledge**:	50% Theoretical 50% Practical

		b. Ensures effective command and control over all response activities, including resource allocation, communication, and operational safety.	Familiarity with command and control principles in complex, multi-agency environments and challenging terrains. - **Behaviour**: Decisive and adaptable, ensuring that command and control structures are effective and responsive to the evolving situation.	
	6. Fire Suppression and Rescue Operations in Remote Areas	a. Utilises appropriate firefighting techniques and equipment, considering the unique challenges of operating in remote or difficult-to-access locations. b. Demonstrates proficiency in conducting rescue operations, including accessing and extracting passengers and crew from the aircraft safely.	- **Skill**: Proficient in applying fire suppression and rescue techniques specific to remote or off-aerodrome environments. - **Knowledge**: Understanding of firefighting tactics and rescue procedures adapted to the constraints of remote locations. - **Behaviour**: Safety-conscious and resourceful, ensuring that operations are conducted effectively despite environmental	50% Theoretical 50% Practical

			and logistical challenges.	
	7. Hazard Containment and Environmental Protection	a. Identifies and mitigates secondary hazards such as fuel spills, hazardous materials, or environmental threats posed by the aircraft and its cargo. b. Implements environmental protection measures to minimise the impact of the incident on the surrounding area.	- **Skill**: Competent in managing hazards in remote locations, ensuring the safety of responders and the protection of the environment. - **Knowledge**: Familiarity with hazardous materials response, spill containment, and environmental protection protocols. - **Behaviour**: Proactive and safety-focused, ensuring that hazards are managed effectively to prevent additional risks.	50% Theoretical 50% Practical
	8. Casualty Management and Medical Support Coordination	a. Provides initial medical care to casualties, including triage and stabilisation, until professional medical assistance arrives. b. Coordinates with local medical teams and emergency services to ensure the	- **Skill**: Proficient in administering basic medical care and coordinating with medical teams for the evacuation and treatment of casualties. - **Knowledge**: Understanding of triage protocols, basic life support, and coordination	50% Theoretical 50% Practical

		efficient evacuation and treatment of casualties.	with medical responders in remote areas. - **Behaviour**: Calm and composed, ensuring effective casualty management under challenging conditions.	
	9. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to review the effectiveness of the response to the off-aerodrome emergency. b. Identifies lessons learned and integrates them into future training and operational procedures to improve response readiness.	- **Skill**: Competent in analysing post-incident performance and identifying areas for improvement related to response in remote environments. - **Knowledge**: Familiarity with debriefing techniques and the process of integrating lessons learned into operational planning. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that lessons learned are applied to enhance future responses in remote environments.	50% Theoretical 50% Practical

Competency Unit 15: Apply Triage and Medical Care to Casualties

This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in applying triage and providing medical care to casualties during emergency situations, including aircraft incidents, mass casualty events, and public health emergencies. This unit covers triage principles, emergency medical care, and coordination with medical responders to ensure effective and life-saving interventions.

Skill Development: This unit develops essential skills in triage, emergency medical care, communication with medical responders, and the management of multiple casualties. Personnel are trained to provide life-saving care efficiently and effectively, even under high-pressure conditions.

Behavioural Expectations: Personnel are expected to demonstrate calmness, effective communication, and precision in administering medical care. A proactive and organised approach to casualty management is critical to ensuring the best possible outcomes in emergency situations.

Assessment Ratio: This unit combines theoretical knowledge of triage and medical care principles with practical application in real-world scenarios. Theoretical assessments focus on understanding triage systems, medical interventions, and communication protocols, while practical assessments emphasise the execution of triage, medical care, and coordination during mass casualty events.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
15: Apply Triage and Medical Care to Casualties	1. Understand Triage Principles and Protocols	a. Demonstrates comprehensive knowledge of triage principles, including the categorisation of casualties based on the severity of their condition. b. Identifies and applies triage tags or systems (e.g., START) to prioritise care effectively.	- **Skill**: Proficient in applying triage protocols to quickly assess and categorise casualties in emergency situations. - **Knowledge**: Familiarity with triage systems such as START (Simple Triage and Rapid Treatment) and the principles of mass casualty management. - **Behaviour**: Decisive and methodical, ensuring that triage is conducted accurately to prioritise life-saving care.	60% Theoretical 40% Practical
	2. Rapid Assessment of Casualty Condition	a. Conducts a rapid assessment of each casualty, evaluating	- **Skill**: Competent in performing a quick and accurate	50% Theoretical 50% Practical

		airway, breathing, circulation, and disability (ABCD approach). b. Identifies life-threatening conditions and initiates immediate life-saving interventions.	assessment of casualties to identify immediate medical needs. - **Knowledge**: Understanding of the ABCD assessment framework and its application in emergency medical situations. - **Behaviour**: Calm and focused, ensuring that assessments are performed quickly and efficiently to guide emergency care.	
	3. Application of Emergency Medical Care	a. Administers emergency medical care, including basic life support (BLS), bleeding control, airway management, and shock management. b. Demonstrates proficiency in using emergency medical equipment, such as AEDs, oxygen therapy, and suction devices.	- **Skill**: Proficient in applying emergency medical interventions to stabilise casualties and prevent deterioration. - **Knowledge**: Familiarity with emergency medical procedures, including CPR, wound care, and the use of medical equipment. - **Behaviour**: Skilled and confident, ensuring that medical care is	50% Theoretical 50% Practical

			delivered effectively to support casualty survival and recovery.	
	4. Coordination with Medical Responders and Agencies	a. Communicates effectively with on-site medical teams, paramedics, and healthcare providers to ensure seamless transfer of care. b. Provides accurate and concise information regarding casualty status and interventions performed.	- **Skill**: Proficient in coordinating with medical responders to facilitate the efficient transfer and care of casualties. - **Knowledge**: Understanding of communication protocols and the importance of accurate information transfer in medical emergencies. - **Behaviour**: Collaborative and clear, ensuring that medical responders receive the necessary information to continue	50% Theoretical 50% Practical
	5. Management of Multiple Casualties and Mass Casualty Incidents	a. Demonstrates the ability to manage multiple casualties simultaneously, ensuring that triage and medical care are delivered effectively. b. Adapts the response	- **Skill**: Competent in managing the complexities of mass casualty incidents, ensuring that resources are allocated efficiently. - **Knowledge**: Awareness of the principles of mass	50% Theoretical 50% Practical

		strategy to address the unique challenges of mass casualty incidents, including resource allocation and casualty prioritisation.	casualty management and the challenges associated with large-scale emergencies. - **Behaviour**: Organised and adaptable, ensuring that casualty care is prioritised and managed effectively in high-pressure situations.	
	6. Use of Personal Protective Equipment (PPE) and Infection Control	a. Utilises appropriate PPE when providing medical care to prevent exposure to bloodborne pathogens and infectious diseases. b. Follows infection control protocols to protect both responders and casualties from potential contamination.	- **Skill**: Proficient in selecting and using PPE and applying infection control measures during medical interventions. - **Knowledge**: Familiarity with infection control protocols, including the use of gloves, masks, and other protective equipment. - **Behaviour**: Safety-conscious and disciplined, ensuring that PPE is used correctly and consistently to minimise health risks.	40% Theoretical 60% Practical
	7. Documentation and Reporting	a. Accurately documents all	- **Skill**: Competent in maintaining	50% Theoretical 50% Practical

	of Medical Interventions	medical interventions, including assessments, treatments provided, and casualty outcomes. b. Ensures that documentation is thorough, organised, and compliant with legal and regulatory requirements.	detailed and accurate medical records during the course of an incident. - **Knowledge**: Understanding of medical documentation standards and the legal requirements for reporting casualty care. - **Behaviour**: Meticulous and professional, ensuring that all medical interventions are documented accurately and completely.	
	8. Post-Incident Debrief and Continuous Improvement	a. Participates in post-incident debriefings to review the effectiveness of triage and medical care during the incident. b. Identifies lessons learned and integrates them into future training and operational procedures to enhance casualty management capabilities.	- **Skill**: Competent in reviewing and analysing medical response performance and identifying areas for improvement. - **Knowledge**: Familiarity with debriefing techniques and how to apply lessons learned to improve future responses. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that	50% Theoretical 50% Practical

			casualty care is continuously refined and enhanced.	

Competency Unit 16: Understand and Apply Airside Safety				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in understanding and applying airside safety protocols, contributing to safe operations within the airport environment. This unit covers essential knowledge of airside hazards, operational safety, communication protocols, and compliance with airside regulations, ensuring personnel can navigate and operate safely in this high-risk environment.				
Skill Development: This unit emphasises the development of key skills such as hazard identification, communication, personal safety, and emergency response, ensuring personnel are equipped to operate safely and efficiently within the airside environment. **Behavioural Expectations**: Personnel are expected to demonstrate vigilance, situational awareness, and strict adherence to safety protocols. Collaboration, communication, and proactive hazard management are critical to maintaining a safe and secure airside operational environment. **Assessment Ratio**: Theoretical assessments ensure personnel understand critical airside regulations, hazard identification, and safety protocols. Practical assessments are essential for verifying that ARFFS personnel can apply this knowledge in real-world airside operations, particularly in high-risk environments.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
16: Understand and Apply Airside Safety	1. Understand Airside Layout and Regulations	a. Demonstrates a comprehensive understanding of the airside layout, including runways, taxiways, and apron areas. b. Identifies and adheres to relevant airside regulations and operational zones.	- Skill: Proficient in navigating the airside environment, recognising critical operational zones and restricted areas. - Knowledge: Familiarity with GCAA and national regulations governing airside operations. - Behaviour: Detail-oriented and compliant with airside regulations, maintaining strict adherence to safety protocols.	60% Theoretical 40% Practical

	2. Airside Vehicle and Equipment Safety	a. Demonstrates safe operation of vehicles and equipment within the airside environment, respecting speed limits and right-of-way rules. b. Performs regular pre-operational checks on airside vehicles.	- Skill: Competent in driving and positioning ARFFS vehicles in compliance with airside driving rules and equipment handling protocols. - Knowledge: Awareness of airside traffic management, vehicle speed restrictions, and pre-operational vehicle safety checks. - Behaviour: Responsible and safety-conscious in operating vehicles and equipment in a high-risk airside environment.	40% Theoretical 60% Practical
	3. Identification of Airside Hazards	a. Identifies potential airside hazards, including Foreign Object Debris (FOD), wildlife, jet blast, and propeller wash. b. Implements appropriate mitigation measures to control or eliminate identified hazards.	- Skill: Proficient in recognising airside hazards and taking immediate action to reduce risks. - Knowledge: Understanding of common airside hazards, including FOD, wildlife management, and environmental conditions. - Behaviour: Proactive and vigilant in identifying and mitigating airside hazards,	50% Theoretical 50% Practical

			ensuring a safe operational environment.	
	4. Airside Safety Communication Protocols	a. Demonstrates the correct use of radio communication, adhering to standard GCAA phraseology for safe airside operations. b. Maintains clear and continuous communication with air traffic control and ground crews.	- Skill: Proficient in using radio communication equipment to maintain operational safety and relay information to relevant airside personnel. - Knowledge: Familiarity with GCAA radio telephony (RT) procedures and airside communication protocols. - Behaviour: Clear, precise, and professional in all communications, ensuring critical information is transmitted without delay or ambiguity.	50% Theoretical 50% Practical
	5. Personal Safety in the Airside Environment	a. Follows personal safety guidelines, including the correct use of Personal Protective Equipment (PPE) and high-visibility clothing. b. Demonstrates situational awareness when operating near aircraft and ground	- Skill: Proficient in maintaining personal safety while operating in proximity to aircraft and ground support equipment. - Knowledge: Awareness of the need for high-visibility clothing, PPE, and safe distancing from aircraft and active operational zones.	40% Theoretical 60% Practical

		support equipment.	- Behaviour: Disciplined and safety-focused in maintaining personal safety standards and situational awareness.	
	6. Emergency Response and Airside Incident Management	a. Demonstrates understanding of airside emergency response procedures, including access routes, shoulder points, and coordination with air traffic control. b. Safely navigates airside during emergency incidents while ensuring safety protocols are maintained.	- Skill: Competent in responding to airside emergencies, ensuring rapid, safe, and compliant access to incident scenes. - Knowledge: Familiarity with airside emergency protocols, including coordination with ATC and other agencies. - Behaviour: Calm and methodical in emergency situations, ensuring compliance with safety regulations while maintaining a sense of urgency.	40% Theoretical 60% Practical
	7. Adherence to Airside Security Procedures	a. Complies with all airside security requirements, including restricted access areas and ID display rules. b. Demonstrates awareness of security risks and how to report	- Skill: Competent in adhering to airside security protocols, ensuring all access and identification procedures are followed. - Knowledge: Understanding of security regulations and	50% Theoretical 50% Practical

		suspicious activity.	reporting mechanisms for security breaches. - Behaviour: Security-conscious and compliant, ensuring personal actions contribute to a secure airside environment.	
	8. Continuous Training in Airside Safety	a. Participates in regular airside safety briefings, drills, and training to maintain operational safety knowledge. b. Stays updated on changes to airside safety protocols, regulations, and best practices.	- Skill: Proficient in applying updated airside safety protocols through continuous learning and participation in safety exercises. - Knowledge: Awareness of evolving airside safety regulations and emerging risks. - Behaviour: Committed to continuous improvement, maintaining high levels of safety awareness and operational readiness in airside activities.	50% Theoretical 50% Practical

Competency Unit 17: Drive ARFFS Appliances at Airside
This competency unit ensures that ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in driving ARFFS appliances safely and effectively within the airside environment. This unit covers essential knowledge of airside driving rules, vehicle control, hazard awareness, and compliance with airside regulations. The goal is to ensure personnel can navigate airside safely while responding efficiently to incidents.
Skill Development: This unit focuses on developing key driving skills specific to ARFFS appliances in the unique and high-risk airside environment. Personnel are trained in safe driving techniques, emergency response protocols, and vehicle positioning at incidents to ensure both operational effectiveness and safety.

Behavioural Expectations: ARFFS personnel are expected to demonstrate vigilance, control, and situational awareness while driving in airside environments. Safety, communication, and adherence to airside regulations are paramount in maintaining operational effectiveness and preventing accidents.

Assessment Ratio: The practical component is heavily emphasised, given the critical importance of hands-on proficiency in driving large ARFFS appliances within the airside environment. Theoretical knowledge ensures personnel understand regulations, hazard identification, and vehicle dynamics, supporting their ability to make safe and informed decisions during operations.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
17: Drive ARFFS Appliances at Airside	1. Understand Airside Driving Regulations and Layout	a. Demonstrates comprehensive understanding of airside driving regulations, including speed limits, right-of-way rules, and designated routes. b. Identifies restricted areas, no-go zones, and safe vehicle operating zones.	- Skill: Proficient in navigating airside while adhering to all driving regulations and safety protocols. - Knowledge: Understanding of GCAA and national airside driving regulations. - Behaviour: Compliant, safety-conscious, and detail-oriented in following airside driving regulations and operational procedures.	60% Theoretical 40% Practical
	2. Pre-Operational Vehicle Checks	a. Conducts thorough pre-operational inspections of the ARFFS appliance, checking for mechanical readiness and operational functionality. b. Ensures that critical systems, including brakes, lights, sirens, and communication equipment, are	- Skill: Competent in identifying any mechanical faults or safety issues during pre-operational vehicle checks. - Knowledge: Familiarity with vehicle systems, including pumps, tires, brakes, and communication devices. - Behaviour: Diligent and systematic in conducting pre-checks, ensuring	50% Theoretical 50% Practical

		fully operational.	vehicle readiness for emergency response.	
	3. Safe Driving Techniques for ARFFS Appliances	a. Demonstrates safe driving techniques specific to large, heavy ARFFS appliances, including controlled acceleration, braking, and turning. b. Adjusts driving speed and technique based on airside conditions, such as weather, runway crossings, and traffic.	- Skill: Proficient in controlling the vehicle under various airside conditions, ensuring stability, speed control, and manoeuvrability. - Knowledge: Understanding of vehicle dynamics, including weight distribution and response to controls. - Behaviour: Calm, precise, and safety-conscious in all driving actions, prioritising control and safety over speed.	40% Theoretical 60% Practical
	4. Emergency Driving Protocols at Airside	a. Demonstrates the ability to drive at increased speeds while adhering to safety protocols during emergency responses. b. Utilises emergency warning systems (lights, sirens) appropriately to alert other vehicles and personnel.	- Skill: Proficient in emergency response driving, ensuring rapid and safe transit to incident locations. - Knowledge: Awareness of emergency driving regulations and protocols specific to airside environments. - Behaviour: Decisive and controlled, balancing urgency with safety during	30% Theoretical 70% Practical

			emergency response driving.	
	5. Hazard Awareness and Management	a. Identifies and mitigates hazards such as Foreign Object Debris (FOD), wildlife, other vehicles, and active aircraft. b. Demonstrates ability to adjust driving techniques and routes to avoid hazards and maintain operational safety.	- Skill: Proficient in recognising and avoiding airside hazards while driving ARFFS appliances. - Knowledge: Understanding of common airside hazards and how to mitigate risks. - Behaviour: Vigilant and proactive in identifying hazards and adjusting driving behaviour to maintain safety.	40% Theoretical 60% Practical
	7. Communication During Airside Driving and Response	a. Maintains clear and continuous communication with air traffic control (ATC), ground personnel, and other ARFFS teams during transit and while positioned at incidents. b. Uses standard radio communication protocols and GCAA-compliant phraseology.	- Skill: Proficient in using radio communication systems to relay critical information during driving and at incident scenes. - Knowledge: Familiarity with radio telephony (RT) procedures and communication protocols for airside operations. - Behaviour: Clear, concise, and professional in all communications, ensuring that critical information is transmitted	50% Theoretical 50% Practical

			accurately and promptly.	
	8. Post-Incident Vehicle Checks and Maintenance	a. Conducts post-incident inspections of the ARFFS appliance, checking for any damage or wear caused during the operation. b. Ensures that the vehicle is cleaned, refuelled, and restocked for future readiness.	- Skill: Proficient in performing post-incident vehicle inspections and ensuring that the appliance is fully operational for the next deployment. - Knowledge: Understanding of post-operation maintenance requirements, including cleaning, refuelling, and equipment replenishment. - Behaviour: Responsible and thorough in maintaining vehicle readiness for future emergency responses.	50% Theoretical 50% Practical

Competency Unit 18: Apply Command and Control at Incidents				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in understanding and applying command and control principles during incidents. This unit covers incident command structure, decision-making, communication, and coordination to ensure that emergency operations are carried out efficiently, safely, and in a unified manner.				
Skill Development: This unit emphasises critical skills in leadership, decision-making, and resource management, ensuring that personnel can confidently assume command roles during complex incidents. Communication, flexibility, and the ability to adapt plans are key areas of focus. **Behavioural Expectations:** Personnel are expected to demonstrate strong leadership, clear communication, and decisiveness in their command roles. The ability to maintain situational awareness, coordinate multi-agency responses, and make rapid, informed decisions is critical to the success of the incident command process. **Assessment Ratio:** Theoretical and practical assessments are closely balanced, reflecting the need for both comprehensive knowledge of command and control frameworks and the ability to apply these frameworks effectively during live incidents. Practical assessments verify decision-making, communication, and resource management in real-time scenarios.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**

18: Apply Command and Control at Incidents	1. Understand the Incident Command System (ICS)	a. Demonstrates a comprehensive understanding of the ICS framework, including roles, responsibilities, and lines of authority. b. Applies ICS principles to manage resources, personnel, and operations effectively.	- Skill: Proficient in implementing ICS during incidents to ensure clear command structure and coordination. - Knowledge: Understanding of ICS, its hierarchy, and its application in multi-agency responses. - Behaviour: Organised and structured, ensuring the ICS is applied properly, maintaining control and clarity in all operational phases.	60% Theoretical 40% Practical
	2. Establishing Incident Command	a. Establishes an incident command post (ICP) promptly and effectively, ensuring visibility and accessibility. b. Assumes command of the scene, delegating tasks and responsibilities as required.	- Skill: Competent in setting up and leading an ICP, ensuring that it serves as the central point for decision-making and communication. - Knowledge: Familiarity with ICP setup protocols and incident scene management. - Behaviour: Decisive and assertive in taking control of the scene and ensuring operational focus and efficiency.	50% Theoretical 50% Practical
	3. Effective Decision-Making under Pressure	a. Demonstrates the ability to make critical, timely decisions under pressure, balancing risk, operational	- Skill: Proficient in evaluating complex situations and making clear, confident decisions in high-pressure environments.	40% Theoretical 60% Practical

		needs, and safety. b. Evaluates available information quickly and adapts decisions as the incident evolves.	- Knowledge: Understanding of decision-making models, risk assessment, and situational awareness techniques. - Behaviour: Calm, composed, and decisive, ensuring decisions are made with both safety and operational success in mind.	
	4. Command and Control of Resources	a. Coordinates the allocation and deployment of personnel, vehicles, and equipment in alignment with the incident action plan (IAP). b. Monitors and adjusts resource deployment as the incident progresses.	- Skill: Competent in resource management, ensuring that personnel and equipment are deployed efficiently and in accordance with the IAP. - Knowledge: Familiarity with resource tracking systems and operational requirements. - Behaviour: Organised and responsive, ensuring that resources are managed effectively throughout the incident.	50% Theoretical 50% Practical
	5. Communication and Coordination with Stakeholders	a. Maintains clear and continuous communication with internal teams, external agencies, and air traffic control (ATC). b. Ensures that all stakeholders are informed of	- Skill: Proficient in multi-agency communication and ensuring a unified response across all involved parties. - Knowledge: Understanding of communication protocols,	50% Theoretical 50% Practical

		the incident status and operational developments.	including radio telephony (RT) and standard GCAA phraseology. - Behaviour: Collaborative and professional, ensuring communication is clear, concise, and consistent to prevent miscommunication and confusion.	
	6. Monitoring Incident Progress and Adjusting the Plan	a. Continuously monitors the status of the incident and adapts the IAP based on real-time developments. b. Conducts dynamic risk assessments and modifies operational tactics to meet changing conditions.	- Skill: Proficient in monitoring incident progress and identifying when adjustments to the IAP are required. - Knowledge: Familiarity with dynamic risk assessment methods and operational planning strategies. - Behaviour: Adaptive and vigilant, ensuring that operational plans are flexible and responsive to the evolving nature of the incident.	50% Theoretical 50% Practical
	7. Leading Incident Debriefings and Post-Incident Analysis	a. Leads comprehensive debriefs post-incident, capturing lessons learned and areas for improvement. b. Prepares detailed post-incident reports, including an evaluation of	- **Skill**: Competent in conducting post-incident debriefings, facilitating open discussion, and identifying areas for improvement. - **Knowledge**: Understanding of performance evaluation metrics and debriefing	50% Theoretical 50% Practical

		command and control effectiveness.	procedures. - **Behaviour**: Analytical and reflective, ensuring constructive feedback is gathered and used to enhance future command and control performance.	
	8. Continuous Learning and Command Competency Development	a. Engages in continuous training and exercises to enhance command and control skills. b. Stays updated on advancements in incident management and command techniques.	- **Skill**: Proficient in maintaining and improving command and control abilities through regular training and scenario-based exercises. - **Knowledge**: Awareness of current trends and best practices in incident command. - **Behaviour**: Committed to continuous improvement, seeking opportunities for growth and skill enhancement in command roles.	40% Theoretical 60% Practical

Competency Unit 19: Implement ARFFS Actions to Resolve Incidents
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the knowledge, skills, and behaviours required to implement effective actions in response to various types of incidents, ensuring a safe and coordinated resolution. This unit covers incident assessment, decision-making, coordination, and execution of operational plans to manage emergencies efficiently.
Skill Development: This unit develops key incident management skills, including situation assessment, risk management, resource coordination, and decision-making. Personnel are trained to take decisive action while maintaining flexibility in response to evolving incident conditions.

Behavioural Expectations: Personnel are expected to demonstrate leadership, adaptability, and clear communication throughout the incident resolution process. Maintaining control over resources, ensuring safety, and managing risks effectively are critical to successful incident resolution.

Assessment Ratio: Theoretical and practical assessments are closely balanced, reflecting the importance of both deep knowledge of incident management principles and hands-on proficiency in executing actions to resolve incidents. Theoretical understanding ensures personnel can develop effective plans, while practical assessments ensure they can apply these plans in dynamic and high-pressure situations.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
19: Implement ARFFS Actions to Resolve Incidents	1. Incident Assessment and Initial Response	a. Conducts a rapid and accurate assessment of the incident, identifying hazards, risks, and immediate priorities. b. Establishes incident command and initiates first-response actions.	- **Skill**: Proficient in gathering critical information to assess the situation accurately, identifying hazards and determining priorities. - **Knowledge**: Understanding of incident management frameworks, hazard identification, and initial response protocols. - **Behaviour**: Decisive and methodical in initiating a structured response, ensuring the safety of personnel and assets.	50% Theoretical 50% Practical
	2. Development of an Incident Action Plan (IAP)	a. Develops a clear and structured incident action plan, defining operational objectives and resource allocation. b. Communicates the IAP to all relevant personnel and agencies.	- **Skill**: Competent in formulating an effective IAP based on the assessed risks and operational requirements. - **Knowledge**: Familiarity with the components of an IAP, including objectives, strategies, and resource	60% Theoretical 40% Practical

			assignments. - **Behaviour**: Organised and strategic in developing and communicating an IAP that ensures clear direction and operational focus.	
	3. Execution of Operational Tasks	a. Coordinates and executes operational tasks in line with the incident action plan. b. Deploys resources effectively to resolve the incident while managing time, risk, and safety.	- **Skill**: Proficient in executing operational tasks, managing personnel, and deploying resources in a manner consistent with the incident objectives. - **Knowledge**: Understanding of resource allocation, task prioritisation, and operational safety standards. - **Behaviour**: Decisive and efficient, ensuring that tasks are carried out methodically while maintaining control over the operation.	40% Theoretical 60% Practical
	4. Dynamic Risk Assessment and Adaptability	a. Conducts ongoing dynamic risk assessments throughout the incident, adapting actions to the evolving situation. b. Modifies the IAP as required to mitigate emerging risks and achieve incident objectives.	- **Skill**: Proficient in continuously assessing the incident environment, identifying new risks, and adjusting the operational plan accordingly. - **Knowledge**: Awareness of risk management principles and dynamic assessment techniques.	50% Theoretical 50% Practical

			- **Behaviour**: Adaptable and responsive, ensuring operational actions are flexible to changing conditions and risks.	
	5. Communication and Coordination with Response Teams	a. Maintains clear, concise, and continuous communication with all responding teams and agencies. b. Coordinates effectively with external agencies to ensure unified and collaborative action.	- **Skill**: Proficient in maintaining operational communication, ensuring all teams are informed and working in coordination. - **Knowledge**: Familiarity with communication protocols, including radio telephony (RT) and the Incident Command System (ICS). - **Behaviour**: Collaborative and clear in communication, ensuring operational cohesion and preventing miscommunication.	50% Theoretical 50% Practical
	6. Resource Management and Accountability	a. Monitors and manages the use of resources throughout the incident, ensuring optimal deployment and efficiency. b. Tracks personnel, vehicles, and equipment to maintain accountability	- **Skill**: Competent in resource management, ensuring that personnel and equipment are used efficiently without compromising safety. - **Knowledge**: Understanding of resource tracking systems, logistical support, and	50% Theoretical 50% Practical

		and operational readiness.	accountability practices. - **Behaviour**: Responsible and meticulous in monitoring resources, ensuring accurate tracking and effective utilisation.	
	7. Incident Resolution and Debriefing	a. Ensures that the incident is fully resolved, including mitigation of hazards and restoration of normal operations. b. Leads post-incident debriefing, identifying successes, challenges, and areas for improvement.	- **Skill**: Proficient in conducting thorough post-incident debriefs, analysing operational performance, and identifying lessons learned. - **Knowledge**: Awareness of debriefing techniques, post-incident reporting, and performance evaluation metrics. - **Behaviour**: Analytical and reflective, ensuring that all aspects of the incident are reviewed and that improvements are documented for future operations.	50% Theoretical 50% Practical
	8. Continuous Learning and Improvement	a. Participates in post-incident training and exercises to apply lessons learned from previous incidents. b. Stays updated on new incident management techniques, technologies,	- **Skill**: Proficient in applying lessons learned from past incidents to improve future responses. - **Knowledge**: Awareness of evolving incident management technologies, frameworks, and methodologies. - **Behaviour**:	40% Theoretical 60% Practical

		and best practices.	Committed to continuous improvement and operational excellence, ensuring knowledge is up-to-date and applied in future incidents.	

Competency Unit 20: Manage Information for ARFFS Action at Incidents				
This competency unit ensures that ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in managing information for effective decision-making and operational action during incidents. This unit covers the gathering, analysis, communication, and use of information to support incident response, ensuring timely and informed decisions are made for effective incident management.				
Skill Development: This unit develops critical skills in gathering, analysing, and communicating information, enabling personnel to make informed decisions and manage resources effectively during incidents. Information flow management and the use of technology are key components. **Behavioural Expectations:** Personnel are expected to demonstrate analytical thinking, effective communication, and adaptability when managing information at incidents. Timely, accurate, and concise information flow is essential for operational success and ensuring safety. **Assessment Ratio:** Practical assessments are emphasised to ensure personnel can effectively manage information in real-time, dynamic incident environments. Theoretical knowledge underpins the ability to analyse, validate, and communicate information efficiently, ensuring decisions are well-informed and operationally sound.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
20: Manage Information for ARFFS Actions at Incidents	1. Information Gathering and Assessment	a. Collects relevant and accurate information from various sources (e.g., ATC, watchroom, witnesses, monitoring systems) in a timely manner. b. Verifies and validates the accuracy and reliability of the information gathered.	- **Skill**: Proficient in gathering information quickly from diverse sources, ensuring the information is accurate and reliable. - **Knowledge**: Understanding of key information sources and methods for verifying data during incident response. - **Behaviour**: Thorough and diligent in	50% Theoretical 50% Practical

			collecting and assessing information for operational use.	
	2. Analysis of Incident Information	a. Analyses gathered information to determine the nature, scale, and severity of the incident. b. Uses critical thinking to evaluate risks, hazards, and resource requirements based on the available data.	- **Skill**: Competent in analysing data to form an accurate picture of the incident and its potential escalation. - **Knowledge**: Familiarity with risk assessment models and situational analysis techniques for incident management. - **Behaviour**: Analytical and focused, ensuring information is interpreted effectively to support decision-making.	50% Theoretical 50% Practical
	3. Information Flow Management	a. Establishes and maintains clear information flow between the incident command post, responding teams, and external agencies. b. Ensures that critical information is shared in a timely manner to support operational decisions.	- **Skill**: Proficient in managing the flow of information to ensure all relevant parties are informed. - **Knowledge**: Understanding of communication protocols, including how to prioritise and relay critical information. - **Behaviour**:	50% Theoretical 50% Practical

			Organised and communicative, ensuring timely and accurate transmission of essential information to support incident response.	
	4. Use of Technology and Information Systems	a. Utilises incident management systems, digital communication tools, and data monitoring systems to enhance situational awareness. b. Ensures that information systems are used effectively to track resources and monitor incident progression.	- **Skill**: Proficient in using digital systems and communication technologies to enhance information management. - **Knowledge**: Familiarity with incident management software, resource tracking systems, and digital communication platforms. - **Behaviour**: Technologically competent and resourceful in leveraging information systems for operational efficiency.	40% Theoretical 60% Practical
	5. Communication of Key Information for Decision-Making	a. Communicates key information clearly and concisely to the incident commander and other decision-makers. b. Provides real-time updates on	- **Skill**: Proficient in summarising and relaying critical information for decision-making during fast-moving incidents. - **Knowledge**: Understanding	40% Theoretical 60% Practical

		changing conditions, enabling timely and effective decisions.	of decision-making processes and the role of clear, actionable information. - **Behaviour**: Assertive and clear in delivering information, ensuring decision-makers are fully informed at all stages of the incident.	
	6. Documentation and Record-Keeping	a. Accurately records all key information, decisions, and actions taken during the incident. b. Ensures that documentation is thorough, organised, and compliant with regulatory and legal requirements.	- **Skill**: Competent in maintaining detailed and accurate records during the course of an incident, ensuring documentation is complete for post-incident review. - **Knowledge**: Familiarity with record-keeping protocols, legal considerations, and regulatory requirements. - **Behaviour**: Detail-oriented and disciplined, ensuring comprehensive documentation is maintained for accountability and post-incident analysis.	50% Theoretical 50% Practical

	7. Adaptation to Evolving Information	a. Continuously reassesses the situation based on new information and updates the operational plan accordingly. b. Ensures that the incident action plan (IAP) is flexible and responsive to changes in the incident.	- **Skill**: Proficient in adapting to new information and updating operational strategies in response to dynamic situations. - **Knowledge**: Understanding of dynamic risk assessment and operational flexibility. - **Behaviour**: Flexible and adaptive, ensuring that new information is quickly integrated into the response plan to maintain operational effectiveness.	40% Theoretical 60% Practical
	8. Post-Incident Information Review and Analysis	a. Participates in post-incident debriefs to evaluate the effectiveness of information management during the incident. b. Prepares reports on the management of information for use in future training and incident management improvements.	- **Skill**: Competent in analysing information management processes during post-incident reviews and identifying lessons learned. - **Knowledge**: Familiarity with debriefing processes and methods for analysing the effectiveness of information management. - **Behaviour**:	50% Theoretical 50% Practical

			Analytical and reflective, ensuring that information management processes are evaluated for continuous improvement.	

Competency Unit 21: Determine Solutions to Hazards and Risks at Incidents				
This competency unit ensures that ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in identifying, assessing, and determining solutions to hazards and risks during incidents. The unit focuses on risk identification, hazard mitigation, decision-making, and the implementation of strategies to ensure the safety of personnel and the successful resolution of the incident.				
Skill Development: This unit develops critical skills in hazard identification, risk assessment, and the implementation of effective control measures. Personnel are trained to manage risks dynamically, ensuring the safety of both personnel and operations during high-risk incidents. **Behavioural Expectations:** Personnel are expected to demonstrate vigilance, adaptability, and decisiveness in their approach to hazard identification and mitigation. Strong communication and leadership are required to ensure that hazards are addressed promptly and safely, maintaining operational continuity. **Assessment Ratio:** Practical assessments are prioritised to ensure personnel can effectively identify, assess, and mitigate hazards in real-time situations. Theoretical understanding is essential to underpin practical application, providing a structured framework for risk analysis and hazard control.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
21: Determine Solutions to Hazards and Risks at Incidents	1. Hazard Identification at Incidents	a. Identifies all potential hazards at the incident scene, including environmental, structural, and operational risks. b. Prioritises hazards based on their severity and potential impact on operations.	- **Skill**: Proficient in scanning the incident environment for hazards, assessing both immediate and potential risks. - **Knowledge**: Understanding of different hazard types, such as chemical, electrical, and mechanical hazards in aviation environments. - **Behaviour**: Vigilant and systematic in	50% Theoretical 50% Practical

			identifying and prioritising hazards, ensuring that no critical risks are overlooked.	
	2. Risk Assessment and Evaluation	a. Conducts dynamic risk assessments using standardised methodologies (e.g., risk matrices) to evaluate the likelihood and consequence of each hazard. b. Assesses the impact of hazards on personnel, equipment, and operations.	- **Skill**: Competent in applying risk assessment tools to measure the severity and probability of risks associated with identified hazards. - **Knowledge**: Familiarity with risk assessment frameworks, including GCAA standards for risk analysis. - **Behaviour**: Analytical and focused, ensuring a structured approach to evaluating risks and their operational impacts.	50% Theoretical 50% Practical
	3. Determining Solutions for Hazard Mitigation	a. Develops effective mitigation strategies to eliminate or control hazards, ensuring the safety of personnel and operations. b. Implements immediate actions to reduce risk exposure while maintaining	- **Skill**: Proficient in formulating practical, effective solutions to control or eliminate hazards based on risk assessments. - **Knowledge**: Understanding of hazard control measures such as isolation,	40% Theoretical 60% Practical

		operational efficiency.	removal, or engineering controls. - **Behaviour**: Decisive and safety-conscious in determining and implementing hazard mitigation actions, prioritising both safety and operational continuity.	
	4. Communication of Risks and Mitigation Plans	a. Communicates identified hazards, risks, and mitigation strategies clearly to all relevant personnel. b. Ensures that communication is consistent, concise, and in line with GCAA standards and local procedures.	- **Skill**: Proficient in delivering clear, concise communications about hazards and associated risks to teams and command units. - **Knowledge**: Familiarity with GCAA communication protocols and hazard briefing techniques. - **Behaviour**: Collaborative and proactive in ensuring that critical risk information is communicated promptly to ensure effective mitigation.	50% Theoretical 50% Practical
	5. Implementation of Risk Control Measures	a. Deploys appropriate risk control measures, such as personal protective equipment	- **Skill**: Proficient in deploying risk control strategies to protect personnel and manage	40% Theoretical 60% Practical

		(PPE), containment strategies, or evacuation procedures. b. Ensures all risk control measures are implemented in a timely and efficient manner.	operational risks. - **Knowledge**: Understanding of control measures such as PPE, barriers, and containment techniques. - **Behaviour**: Methodical and timely in executing risk control measures, ensuring full compliance with safety protocols.	
	6. Monitoring and Adjusting Hazard Mitigation Actions	a. Monitors the effectiveness of mitigation strategies in real time, ensuring that hazards are being effectively controlled. b. Adjusts mitigation actions as required to respond to changing conditions at the incident.	- **Skill**: Proficient in monitoring hazard control efforts and making real-time adjustments to ensure continuous safety and effectiveness. - **Knowledge**: Familiarity with monitoring techniques and the ability to reassess hazards during ongoing operations. - **Behaviour**: Adaptive and vigilant, ensuring mitigation strategies remain effective in dynamic, high-pressure environments.	50% Theoretical 50% Practical

	7. Post-Incident Hazard and Risk Review	a. Participates in post-incident reviews to assess the effectiveness of hazard identification and risk control actions. b. Identifies areas for improvement and ensures lessons learned are applied to future operations.	- **Skill**: Competent in evaluating hazard mitigation actions and identifying areas for improvement during post-incident debriefings. - **Knowledge**: Familiarity with debriefing protocols and the use of data to improve future risk management processes. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that lessons learned are integrated into future operations.	50% Theoretical 50% Practical
	8. Continuous Training in Hazard and Risk Management	a. Engages in ongoing training and simulations to maintain a high level of competency in hazard identification and risk management. b. Stays updated on new technologies, standards, and best practices for hazard mitigation in aviation incidents.	- **Skill**: Proficient in applying lessons learned from training and real-world incidents to improve hazard management capabilities. - **Knowledge**: Awareness of the latest developments in risk management and hazard control technologies and techniques.	40% Theoretical 60% Practical

			- **Behaviour**: Committed to continuous learning and professional development, ensuring expertise in hazard and risk management is maintained.	

Competency Unit 22: Educate Airport Community in Fire Safety and Prevention				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the skills, knowledge, and behaviours necessary to educate the airport community on fire safety and prevention. The unit covers fire prevention strategies, communication techniques, and engagement with diverse airport stakeholders, ensuring effective dissemination of critical fire safety information.				
Skill Development: This unit focuses on developing essential skills in communication, public engagement, fire risk consultation, and the delivery of hands-on fire safety training. Personnel are expected to create a fire safety culture within the airport community through education and leadership. **Behavioural Expectations:** Personnel are expected to be approachable, confident, and motivational in their role as fire safety educators. Effective communication and the ability to adapt teaching methods to various audiences are key to success in this role. **Assessment Ratio:** The assessment ratio emphasises both the theoretical knowledge of fire safety regulations, best practices, and the practical skills necessary to engage and educate the airport community. Practical assessments focus on delivering effective training and hands-on demonstrations of fire safety equipment.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
22: Educate Airport Community in Fire Safety and Prevention	1. Understand Local Fire Safety Regulations and Best Practices	a. Demonstrates comprehensive knowledge of local fire safety regulations, standards, and best practices applicable to airport environments. b. Identifies key fire hazards in airport operations and facilities.	- **Skill**: Proficient in understanding local fire safety laws, regulations, and guidance specific to airports. - **Knowledge**: Awareness of the most common fire hazards in airport operations (e.g., fuel handling, electrical systems).	60% Theoretical 40% Practical

			- **Behaviour**: Methodical and detail-oriented in adhering to fire safety regulations and recognising hazards.	
	2. Develop Fire Safety and Prevention Education Programs	a. Designs engaging and informative fire safety training programs tailored for different airport community groups (e.g., staff, contractors, passengers). b. Develops educational materials that meet regulatory requirements and effectively communicate fire risks and prevention methods.	- **Skill**: Competent in creating structured fire safety education materials that are relevant to the airport environment. - **Knowledge**: Understanding of how to communicate fire safety principles to various audiences. - **Behaviour**: Creative and strategic in designing educational materials that ensure clear understanding and engagement.	50% Theoretical 50% Practical
	3. Deliver Fire Safety Training and Awareness Campaigns	a. Delivers clear, engaging, and effective fire safety presentations to diverse audiences within the airport community. b. Utilises real-world scenarios and examples to illustrate key	- **Skill**: Proficient in public speaking and delivering fire safety training that resonates with different airport stakeholders. - **Knowledge**: Familiarity with fire safety education techniques and	40% Theoretical 60% Practical

		fire safety and prevention principles.	strategies for effective public engagement. - **Behaviour**: Confident, approachable, and authoritative in delivering presentations and engaging audiences.	
	4. Fire Risk Communication and Consultation	a. Engages with airport stakeholders (management, employees, and contractors) to consult on fire safety concerns and gather feedback on fire prevention measures. b. Communicates fire risks clearly and consults on mitigation strategies that are specific to the airport environment.	- **Skill**: Competent in consulting with airport stakeholders to develop and improve fire safety strategies. - **Knowledge**: Understanding of fire risk communication techniques and collaborative problem-solving approaches. - **Behaviour**: Collaborative and solution-focused, ensuring that stakeholders are involved in fire prevention efforts.	50% Theoretical 50% Practical
	5. Educating on Fire Extinguisher and Fire Equipment Use	a. Provides hands-on training on the proper use of fire extinguishers, alarms, and other fire suppression equipment. b. Ensures that airport	- **Skill**: Proficient in demonstrating and teaching the proper use of fire extinguishers and other fire safety equipment. - **Knowledge**: Understanding	30% Theoretical 70% Practical

		community members can confidently operate basic fire safety equipment during emergencies.	of fire suppression tools and their application in different fire scenarios. - **Behaviour**: Patient and supportive in training participants to build confidence in handling fire equipment.	
	6. Promote Fire Safety Culture in the Airport Community	a. Engages the airport community through regular fire safety reminders, campaigns, and initiatives to promote a fire-aware culture. b. Encourages active participation in fire drills, safety briefings, and fire risk assessments.	- **Skill**: Competent in promoting fire safety as an ongoing priority for all airport community members. - **Knowledge**: Familiarity with strategies for fostering a fire safety culture within large organisations. - **Behaviour**: Proactive and motivational, encouraging airport staff and stakeholders to prioritise fire prevention in their daily activities.	40% Theoretical 60% Practical
	7. Evaluate Fire Safety Education Effectiveness	a. Collects feedback from participants to assess the effectiveness of fire safety training programs and	- **Skill**: Competent in evaluating the success of fire safety education programs through feedback and	50% Theoretical 50% Practical

		educational campaigns. b. Analyses training outcomes and identifies areas for improvement in future fire safety education efforts.	assessment. - **Knowledge**: Understanding of evaluation techniques for educational programs, including data collection and analysis. - **Behaviour**: Reflective and dedicated to continuous improvement, ensuring that fire safety education evolves and remains impactful.	
	8. Continuous Learning and Update of Fire Safety Knowledge	a. Participates in ongoing professional development to stay updated on the latest fire prevention strategies, technologies, and regulations. b. Incorporates new knowledge into future fire safety education programs.	- **Skill**: Proficient in integrating new fire safety knowledge into training programs and adapting to emerging trends. - **Knowledge**: Awareness of advancements in fire safety technology, regulations, and prevention strategies. - **Behaviour**: Committed to lifelong learning, ensuring fire safety education remains current and effective.	50% Theoretical 50% Practical

Competency Unit 23: Conduct Aerodrome Fire Prevention Activities				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in conducting comprehensive fire prevention activities within aerodromes. The unit covers the identification of fire hazards, fire risk assessments, implementation of fire prevention measures, and continuous monitoring to ensure compliance with aerodrome fire safety standards.				
Skill Development: This unit focuses on the development of key skills in fire risk assessment, hazard mitigation, system inspections, and compliance monitoring, ensuring that personnel are prepared to take proactive measures to prevent fires within aerodromes. **Behavioural Expectations:** Personnel are expected to demonstrate vigilance, attention to detail, and proactivity in identifying risks and implementing fire prevention measures. Effective communication and leadership are also essential to fostering a fire-safe environment in the aerodrome community. **Assessment Ratio:** Practical assessments are prioritised to ensure personnel can conduct fire risk assessments, implement fire prevention strategies, and inspect fire safety equipment in real-world settings. Theoretical knowledge supports the ability to develop fire prevention strategies that are aligned with GCAA standards and national regulations.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
23: Conduct Aerodrome Fire Prevention Activities	1. Understanding Aerodrome Fire Prevention Regulations and Standards	a. Demonstrates comprehensive knowledge of ICAO fire prevention regulations and national aviation fire safety standards applicable to aerodromes. b. Identifies key regulatory requirements for fire prevention in airport operations and facilities.	- **Skill**: Proficient in understanding fire prevention regulations specific to aerodromes. - **Knowledge**: Awareness of ICAO and national fire safety standards and how they apply to airport operations. - **Behaviour**: Methodical and compliant in ensuring that fire prevention measures align with regulatory frameworks.	60% Theoretical 40% Practical
	2. Conduct Fire Risk Assessments at Aerodromes	a. Identifies fire hazards across various areas of the aerodrome, including fuel farms, hangars,	- **Skill**: Competent in conducting thorough fire risk assessments at aerodromes.	50% Theoretical 50% Practical

		passenger terminals, and airside operations. b. Evaluates the likelihood and severity of fire risks, using appropriate risk assessment tools.	- **Knowledge**: Understanding of risk assessment methodologies and tools for evaluating fire risks in aviation environments. - **Behaviour**: Analytical and detail-oriented, ensuring that all potential fire hazards are identified and assessed accurately.	
	3. Develop and Implement Fire Prevention Strategies	a. Develops practical fire prevention strategies and procedures tailored to the unique risks present in an aerodrome. b. Implements fire prevention measures, such as controlling ignition sources, proper storage of flammable materials, and enforcing safety protocols.	- **Skill**: Proficient in creating fire prevention plans that address the specific risks and operational needs of an aerodrome. - **Knowledge**: Familiarity with fire prevention techniques such as hazard control, fire suppression readiness, and safety inspections. - **Behaviour**: Proactive and responsible in ensuring that fire prevention strategies are implemented and enforced effectively.	50% Theoretical 50% Practical

	4. Inspect and Maintain Fire Safety Systems and Equipment	a. Conducts regular inspections of fire safety systems (e.g., alarms, sprinklers, extinguishers) to ensure they are fully operational. b. Coordinates maintenance and testing of fire suppression systems to maintain readiness.	- **Skill**: Competent in inspecting fire safety equipment and ensuring that all systems are operational and compliant with safety standards. - **Knowledge**: Understanding of inspection schedules, testing protocols, and maintenance requirements for fire protection systems. - **Behaviour**: Detail-oriented and diligent in ensuring fire safety systems are inspected and maintained to the highest standards.	40% Theoretical 60% Practical
	5. Monitor Aerodrome Fire Prevention Compliance	a. Monitors compliance with fire prevention regulations and aerodrome fire safety procedures. b. Identifies non-compliance issues and takes corrective action, including issuing recommendations or enforcement measures.	- **Skill**: Proficient in monitoring fire safety practices and ensuring compliance with fire prevention regulations across the aerodrome. - **Knowledge**: Awareness of aerodrome fire safety regulations and	50% Theoretical 50% Practical

			enforcement mechanisms. - **Behaviour**: Vigilant and assertive in enforcing compliance and recommending corrective actions where necessary.	
	6. Investigate Fire Incidents and Apply Lessons Learned	a. Provides fire prevention training to aerodrome staff, ensuring they understand fire risks, safety protocols, and emergency response procedures. b. Leads fire safety awareness campaigns to promote a culture of fire prevention.	- **Skill**: Competent in investigating fire incidents, identifying root causes, and applying lessons learned to improve fire prevention strategies. - **Knowledge**: Understanding of fire investigation techniques, root cause analysis, and the application of corrective actions. - **Behaviour**: Analytical and solution-focused, ensuring that fire incidents are thoroughly investigated and lessons learned are integrated into future fire prevention measures.	50% Theoretical 50% Practical
	7. Investigate Fire Incidents and	a. Investigates fire incidents at the	- **Skill**: Competent in investigating	50% Theoretical 50% Practical

	Apply Lessons Learned	aerodrome to identify causes and contributing factors. b. Develops and implements recommendations for preventing similar incidents in the future.	fire incidents, identifying root causes, and applying lessons learned to improve fire prevention strategies. - **Knowledge**: Understanding of fire investigation techniques, root cause analysis, and the application of corrective actions. - **Behaviour**: Analytical and solution-focused, ensuring that fire incidents are thoroughly investigated and lessons learned are integrated into future fire prevention measures.	
	8. Continuous Improvement in Fire Prevention Strategies	a. Engages in continuous professional development to stay updated on the latest fire prevention technologies, standards, and best practices. b. Reviews and updates aerodrome fire prevention strategies regularly to ensure ongoing effectiveness.	- **Skill**: Proficient in reviewing and improving fire prevention strategies based on new knowledge, technologies, and changing aerodrome conditions. - **Knowledge**: Awareness of current trends and best practices in fire	50% Theoretical 50% Practical

			prevention, and the ability to apply them in the aerodrome context. - **Behaviour**: Committed to continuous improvement, ensuring fire prevention measures evolve to meet emerging challenges.	

Competency Unit 24: Understand and Apply Aerodrome Emergency Planning				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the knowledge, skills, and behaviours necessary to understand and apply aerodrome emergency planning effectively. This unit covers the key components of aerodrome emergency plans (AEP), the coordination of resources and stakeholders, and the execution of emergency response procedures to ensure a rapid, organised, and effective response to any emergency incident at the aerodrome.				
Skill Development: This unit develops critical skills in emergency planning, stakeholder coordination, incident command, and communication. Personnel are trained to manage both the development of aerodrome emergency plans and the execution of these plans during actual emergencies or drills. **Behavioural Expectations:** Personnel are expected to demonstrate leadership, decisiveness, and effective communication throughout the planning, activation, and management of aerodrome emergency responses. The ability to collaborate with multiple agencies and continuously improve emergency plans is essential. **Assessment Ratio:** This unit balances theoretical understanding with practical application, ensuring personnel are well-versed in both the regulatory requirements of aerodrome emergency planning and the real-time implementation of emergency procedures. Theoretical assessments ensure comprehension of GCAA and national regulations, while practical assessments focus on applying emergency plans and coordinating responses.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
24: Understand and Apply Aerodrome Emergency Planning	1. Understand Aerodrome Emergency Planning Regulations	a. Demonstrates comprehensive knowledge of GCAA and relevant national regulations governing	- **Skill**: Proficient in understanding the regulatory requirements for developing and implementing an AEP. - **Knowledge**: Familiarity with ICAO and national	60% Theoretical 40% Practical

		aerodrome emergency planning. b. Identifies the mandatory elements of an aerodrome emergency plan (AEP) and the responsibilities of key stakeholders.	regulations, including the roles of key agencies and stakeholders. - **Behaviour**: Diligent and regulatory-compliant, ensuring that the AEP meets all required standards.	
	2. Development of Aerodrome Emergency Plans (AEP)	a. Contributes to the creation or revision of the aerodrome emergency plan, ensuring it is comprehensive, updated, and aligned with GCAA requirements. b. Identifies risks and hazards relevant to the aerodrome that need to be addressed in the emergency plan.	- **Skill**: Competent in developing or revising the AEP to reflect aerodrome-specific risks and ensure preparedness. - **Knowledge**: Understanding of risk identification, hazard analysis, and integration of these factors into emergency planning. - **Behaviour**: Proactive and meticulous in ensuring the AEP is comprehensive, relevant, and regularly updated	50% Theoretical 50% Practical

	3. Coordination with Internal and External Stakeholders	a. Ensures the AEP includes clear roles and responsibilities for internal stakeholders (e.g., ARFFS, airport operations, ATC) and external agencies (e.g., local fire, police, medical services). b. Engages regularly with stakeholders to confirm their readiness and coordination capabilities.	- **Skill**: Proficient in facilitating coordination and communication between all stakeholders involved in the AEP. - **Knowledge**: Familiarity with multi-agency coordination and the roles of various internal and external stakeholders in emergency response. - **Behaviour**: Collaborative and communicative, ensuring that all agencies are well-prepared and informed about their roles in the AEP.	50% Theoretical 50% Practical
	4. Implementing Aerodrome Emergency Exercises	a. Develops and participates in regular full-scale, tabletop, and partial emergency exercises to test the effectiveness of the AEP. b. Ensures that exercises	- **Skill**: Competent in planning, organising, and participating in emergency exercises that test the AEP. - **Knowledge**: Awareness of different types of emergency exercises (e.g., tabletop, full-scale) and how they contribute to overall preparedness. - **Behaviour**:	40% Theoretical 60% Practical

		simulate realistic scenarios and test coordination, communication, and resource deployment.	Organised and proactive in ensuring that exercises are comprehensive and provide valuable insights into the AEP's effectiveness.	
	5. Activation of Aerodrome Emergency Plan	a. Demonstrates the ability to activate the AEP immediately upon detection of an emergency, ensuring that all emergency services are notified and deployed according to plan. b. Coordinates the initial response, including the establishment of command and control systems and communication with ATC	- **Skill**: Proficient in activating the AEP and managing the initial stages of an emergency response. - **Knowledge**: Familiarity with the activation procedures and command structures defined in the AEP. - **Behaviour**: Decisive and clear-headed in managing emergency activations, ensuring that response actions are immediate and coordinated.	40% Theoretical 60% Practical
	6. Post-Emergency	a. Participates in post-incident	- **Skill**: Competent in reviewing and improving the	50% Theoretical 50% Practical

	Review and Improvement of the AEP	reviews and debriefings to evaluate the effectiveness of the AEP during an emergency. b. Identifies lessons learned and ensures they are integrated into future revisions of the emergency plan.	AEP based on lessons learned from actual incidents and exercises. - **Knowledge**: Familiarity with post-incident analysis methods and how to apply lessons learned to emergency planning. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that the AEP evolves based on real-world experience and feedback.	
	7. Communication During an Emergency Incident	a. Ensures clear, consistent, and timely communication between all responding agencies, aerodrome staff, and external support agencies. b. Utilises established communication protocols and ICAO-compliant	- **Skill**: Proficient in maintaining effective communication channels during emergencies, using standard protocols to relay critical information. - **Knowledge**: Awareness of emergency communication strategies, RT procedures, and ICAO communication guidelines. - **Behaviour**: Clear, concise, and authoritative in all communications, ensuring that no	50% Theoretical 50% Practical

		radio telephony (RT) procedures.	vital information is lost during the emergency.	
	8. Post-Emergency Review and Improvement of the AEP	a. Participates in post-incident reviews and debriefings to evaluate the effectiveness of the AEP during an emergency. b. Identifies lessons learned and ensures they are integrated into future revisions of the emergency plan.	- **Skill**: Competent in reviewing and improving the AEP based on lessons learned from actual incidents and exercises. - **Knowledge**: Familiarity with post-incident analysis methods and how to apply lessons learned to emergency planning. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that the AEP evolves based on real-world experience and feedback.	50% Theoretical 50% Practical

Competency Unit 25: Understand and Apply Human Factors Principles
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped with the knowledge, skills, and behaviours necessary to understand and apply human factors principles during emergency operations. The unit covers the impact of human factors on performance, decision-making, teamwork, and safety in high-pressure environments. Personnel are expected to apply these principles to enhance operational effectiveness, safety, and coordination during emergency responses.
Skill Development: This unit focuses on enhancing critical thinking, decision-making, communication, leadership, and stress management skills, ensuring that personnel can apply human factors principles to improve safety, teamwork, and operational efficiency. **Behavioural Expectations:** Personnel are expected to demonstrate strong leadership, effective communication, and proactive management of human factors that influence performance. A commitment to situational awareness, teamwork, and continuous improvement is critical for operational success. **Assessment Ratio:** The balance between theoretical and practical assessments ensures personnel have a deep understanding of human factors principles and can apply them in real-world

	scenarios. Theoretical assessments focus on the ICAO framework and cognitive factors, while practical assessments emphasise the application of these principles during emergency operations.			
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
25: Understand and Apply Human Factors Principles	1. Understanding Human Factors in Aviation Safety	a. Demonstrates a comprehensive understanding of the definition and framework of human factors in the context of aviation safety. b. Explains the key components of human factors, including human performance limitations, communication, decision-making, and situational awareness.	- **Skill**: Proficient in explaining the role of human factors in both individual and team performance in aviation environments. - **Knowledge**: Familiarity with ICAO's human factors principles and the factors influencing human performance (e.g., fatigue, stress, workload). - **Behaviour**: Analytical and safety-focused, ensuring human factors are understood and incorporated into everyday operations.	70% Theoretical 30% Practical
	2. Application of Human	a. Identifies and addresses human performance	- **Skill**: Competent in recognising and mitigating human	60% Theoretical

	Performance Principles	limitations such as fatigue, stress, and cognitive overload in the context of ARFFS operations. b. Applies techniques to mitigate performance issues and improve operational effectiveness.	performance limitations that may affect safety and decision-making during incidents. - **Knowledge**: Understanding of techniques to manage stress, fatigue, and workload in high-pressure environments. - **Behaviour**: Proactive and attentive in addressing factors that could impair performance, ensuring personnel safety and operational efficiency.	40% Practical
	3. Effective Communication and Team Coordination	a. Demonstrates effective communication techniques that reduce the risk of misunderstanding or miscommunication during emergency operations.	- **Skill**: Proficient in applying communication strategies that ensure clarity, brevity, and accuracy in high-stress situations. - **Knowledge**: Familiarity with GCAA communication standards and the role of effective communicati	50% Theoretical 50% Practical

		b. Utilises standard communication protocols and GCAA-compliant radio telephony (RT) procedures.	on in reducing human errors. - **Behaviour**: Clear, concise, and professional in all communications, ensuring critical information is relayed accurately to all team members.	
	4. Decision-Making in High-Pressure Environments	a. Demonstrates the ability to make timely, well-informed decisions during emergency situations, considering all relevant information. b. Uses decision-making models and critical thinking techniques to evaluate options and consequences.	- **Skill**: Competent in making sound decisions under pressure, using structured decision-making processes. - **Knowledge**: Awareness of decision-making models such as the OODA (Observe, Orient, Decide, Act) loop and how they apply in emergencies. - **Behaviour**: Calm, focused, and systematic in decision-making, ensuring that decisions are based on	50% Theoretical 50% Practical

			accurate assessments of the situation.	
	5. Enhancing Situational Awareness	a. Continuously monitors the operational environment to maintain high levels of situational awareness during incidents. b. Identifies factors that may reduce situational awareness, such as distractions or cognitive overload, and takes corrective action.	- **Skill**: Proficient in maintaining situational awareness, ensuring personnel and operations are fully aligned with the current situation. - **Knowledge**: Understanding of the components of situational awareness and how it is influenced by human factors. - **Behaviour**: Vigilant and responsive in ensuring situational awareness is maintained, making real-time adjustments as needed.	40% Theoretical 60% Practical
	6. Managing Stress and Fatigue During Operations	a. Recognises signs of stress and fatigue in self and team members during emergency operations.	- **Skill**: Competent in identifying signs of stress and fatigue and implementing strategies to mitigate their impact on performance. - **Knowledge**:	50% Theoretical 50% Practical

		b. Applies stress management techniques and implements strategies to reduce fatigue-related performance issues.	Familiarity with stress management techniques, including relaxation, breathing exercises, and workload balancing. - **Behaviour**: Supportive and proactive in addressing stress and fatigue, ensuring that operational performance and safety are maintained.	
	7. Leadership and Team Dynamics	a. Demonstrates strong leadership skills, fostering a culture of collaboration and teamwork during emergency response operations. b. Encourages open communication, trust, and shared decision-making among team members.	- **Skill**: Proficient in leading teams, promoting effective teamwork and collaboration to ensure efficient and safe operations. - **Knowledge**: Understanding of team dynamics, including leadership styles and how they influence team performance. - **Behaviour**: Collaborative and inclusive, ensuring that	40% Theoretical 60% Practical

			all team members contribute to decision-making and operations in a cohesive manner.	
	8. Continuous Improvement Through Human Factors Integration	a. Participates in post-incident reviews and debriefs, focusing on how human factors influenced performance during operations. b. Identifies lessons learned from the application of human factors principles and integrates them into future operations and training.	- **Skill**: Competent in evaluating the role of human factors in operational performance and identifying areas for improvement. - **Knowledge**: Familiarity with debriefing and post-incident review processes, with a focus on human factors. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that human factors are integrated into training and operations to enhance future performance.	50% Theoretical 50% Practical

Competency Unit 26: Response to Incidents Involving Dangerous Goods

This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in responding to incidents involving dangerous goods (hazardous materials). The unit covers hazard identification, risk assessment, containment procedures, and coordination with specialised response teams to mitigate the risks posed by dangerous goods incidents, ensuring the safety of personnel, the environment, and airport operations.

Skill Development: This unit develops essential skills in hazard identification, containment, communication, and decontamination. Personnel are expected to manage dangerous goods incidents safely, minimising risks to people, the environment, and operations.

Behavioural Expectations: Personnel are expected to be vigilant, safety-focused, and collaborative during dangerous goods incidents. Effective communication, quick decision-making, and leadership in hazardous environments are critical to operational success.

Assessment Ratio: Theoretical and practical assessments are balanced to ensure personnel are proficient in both understanding the regulations and classifications of dangerous goods and applying real-time response strategies. Theoretical assessments focus on regulations, risk identification, and planning, while practical assessments focus on containment, mitigation, and coordination with external response teams.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
26: Response to Incidents Involving Dangerous Goods (Hazardous Materials)	1. Understanding Dangerous Goods Regulations and Classification	a. Demonstrates comprehensive knowledge of GCAA regulations, including ICAO Annex 18, related to the transportation and handling of dangerous goods. b. Identifies the classification and labelling systems used for dangerous goods, including UN numbers and hazard classes.	- **Skill**: Proficient in identifying and understanding dangerous goods classifications and labelling. - **Knowledge**: Familiarity with ICAO Annex 18, the Dangerous Goods Regulations (DGR), and the UN classification system. - **Behaviour**: Methodical and compliant, ensuring that dangerous goods are properly identified and managed according to regulatory standards.	70% Theoretical 30% Practical
	2. Hazard Identification and Risk Assessment for	a. Accurately identifies the	- **Skill**: Proficient in quickly identifying hazardous	60% Theoretical 40% Practical

	Dangerous Goods	type and potential hazards of dangerous goods involved in an incident through the use of placards, manifests, and safety data sheets (SDS). b. Conducts a risk assessment to evaluate the threat to personnel, aircraft, and the environment.	materials and assessing the associated risks. - **Knowledge**: Understanding of how to interpret safety data sheets (SDS), manifests, and labels to assess hazards. - **Behaviour**: Analytical and vigilant, ensuring a thorough assessment of the potential risks posed by hazardous materials in an emergency situation.	
	3. Safe Containment and Mitigation of Hazardous Materials	a. Implements containment procedures to prevent the spread of hazardous materials, including the use of barriers, absorbents, and neutralising agents. b. Utilises appropriate personal protective	- **Skill**: Proficient in safely containing dangerous goods using appropriate methods and equipment. - **Knowledge**: Familiarity with containment techniques, spill response protocols, and the use of PPE in hazardous environments. - **Behaviour**: Safety-conscious and methodical in applying containment measures, prioritising the protection of	50% Theoretical 50% Practical

		equipment (PPE) and ensures team members do the same.	personnel and the environment.	
	4. Communication and Coordination with Specialised Response Teams	a. Establishes clear and continuous communication with specialised hazardous materials response teams and external agencies (e.g., civil defense, police security, environmental agencies, etc). b. Coordinates response activities, ensuring the roles of ARFFS personnel and external responders are clearly defined.	- **Skill**: Proficient in coordinating with hazardous materials teams and ensuring a unified response. - **Knowledge**: Understanding of communication protocols and coordination procedures for multi-agency responses to dangerous goods incidents. - **Behaviour**: Collaborative and communicative, ensuring seamless coordination between ARFFS personnel and external response teams.	50% Theoretical 50% Practical
	5. Implementing Decontamination Procedures	a. Implements decontamination procedures for personnel, equipment, and affected areas to prevent	- **Skill**: Competent in executing decontamination procedures, ensuring that all affected personnel and equipment are decontaminated safely.	50% Theoretical 50% Practical

		contamination spread. b. Follows established protocols for the safe disposal of hazardous materials.	- **Knowledge**: Familiarity with decontamination techniques, including the use of decontamination stations and proper disposal methods. - **Behaviour**: Methodical and safety-conscious in applying decontamination procedures to minimise health and environmental risks.	
	6. Evacuation and Public Safety Measures	a. Evaluates the need for evacuation and implements evacuation protocols if dangerous goods pose an imminent threat to the public or personnel. b. Ensures that evacuation is carried out safely and efficiently, with clear communication and guidance.	- **Skill**: Proficient in assessing evacuation needs and implementing safe evacuation protocols. - **Knowledge**: Understanding of evacuation procedures, safety zones, and crowd control measures in dangerous goods scenarios. - **Behaviour**: Decisive and safety-focused in managing evacuations, ensuring the protection of personnel and the public.	40% Theoretical 60% Practical

	7. Monitoring and Adjusting Incident Response Actions	a. Continuously monitors the status of the hazardous materials incident and adjusts response strategies based on evolving conditions. b. Conducts dynamic risk assessments to ensure the ongoing safety of personnel and the environment.	- **Skill**: Competent in monitoring the progress of the incident and adapting response actions accordingly. - **Knowledge**: Familiarity with dynamic risk assessment methods and the ability to adjust containment, mitigation, and response strategies based on new information. - **Behaviour**: Vigilant and adaptive, ensuring that incident response actions remain effective and aligned with safety objectives.	50% Theoretical 50% Practical
	8. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to evaluate the effectiveness of the response to dangerous goods incidents. b. Identifies lessons learned and integrates them into future training and	- **Skill**: Competent in analysing the response to incidents involving hazardous materials and identifying areas for improvement. - **Knowledge**: Familiarity with debriefing techniques and post-incident analysis, particularly concerning hazardous materials.	50% Theoretical 50% Practical

		operational protocols.	- **Behaviour**: Reflective and committed to continuous improvement, ensuring that lessons learned are applied to enhance future responses to dangerous goods incidents.	

Competency Unit 27: Response to Incidents in Difficult Environments and 1 000 metres Response Area				
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are fully equipped to respond effectively to incidents that occur in challenging environments, particularly within the critical 1000-metre response area from the runway threshold. This unit covers terrain-specific response strategies, incident management in remote or difficult areas, and coordination with external agencies to ensure a rapid and effective response in challenging conditions.				
Skill Development: This unit develops critical skills in navigating difficult environment and 1000-metres response area, resource deployment, incident command, and the use of specialised equipment. Personnel are trained to manage incidents that occur in challenging environments, ensuring a rapid and safe response. **Behavioural Expectations:** Personnel are expected to demonstrate adaptability, resourcefulness, and leadership in responding to incidents in difficult environments. They should remain safety-conscious and ensure clear communication and coordination throughout the operation. **Assessment Ratio:** This unit balances theoretical understanding with practical application. Theoretical assessments focus on understanding the regulatory requirements, environmental challenges, and risk management strategies, while practical assessments emphasise navigation, resource deployment, equipment use, and incident command in difficult or remote environments.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
27: Response to Incidents in Difficult Environments and 1000-metres Response Area	1. Understanding Terrain and Environmental Hazards	a. Identifies potential environmental hazards in the 1000-metre response area from the runway threshold, such as rough terrain,	- **Skill**: Proficient in recognising and assessing environmental hazards that may hinder response operations. - **Knowledge**: Familiarity with aerodrome layouts, environmental challenges, and ICAO requirements for response	60% Theoretical 40% Practical

		vegetation, or water bodies. b. Assesses how these environmental factors may impact response operations, including access routes and safety.	zones. - **Behaviour**: Analytical and proactive, ensuring that terrain factors are accounted for in response planning.	
	2. Route Planning and Access to Difficult Areas	a. Plans and evaluates the fastest and safest access routes to the incident location, considering difficult terrain and environmental obstacles. b. Demonstrates the ability to navigate unfamiliar or challenging terrain using appropriate vehicles and equipment.	- **Skill**: Competent in planning and executing responses in difficult terrain using specialised vehicles and equipment. - **Knowledge**: Understanding of route planning, vehicle limitations, and access considerations in adverse environments. - **Behaviour**: Decisive and resourceful, ensuring efficient access to the incident site while prioritising safety.	50% Theoretical 50% Practical

	3. Deployment of ARFFS Resources in Difficult Environments	a. Deploys ARFFS resources effectively in environments with restricted access, difficult terrain, or other obstacles. b. Ensures that personnel, vehicles, and equipment are positioned to maximise operational effectiveness while minimising risk.	- **Skill**: Proficient in deploying resources in difficult environments, ensuring safety and operational efficiency. - **Knowledge**: Familiarity with the limitations and capabilities of ARFFS vehicles and equipment in difficult terrain. - **Behaviour**: Strategic and safety-conscious, ensuring that resources are deployed effectively despite environmental challenges.	50% Theoretical 50% Practical
	4. Managing Communications in Remote or Difficult Areas	a. Maintains clear and reliable communication between ARFFS teams, air traffic control, and external agencies, despite potential communication challenges in remote areas. b. Utilises appropriate	- **Skill**: Proficient in managing communications in challenging environments, ensuring reliable contact between all response teams. - **Knowledge**: Awareness of communication tools and techniques for maintaining contact in difficult or remote locations. - **Behaviour**: Methodical and proactive,	50% Theoretical 50% Practical

		communication technologies to ensure consistent information flow.	ensuring communication channels remain open throughout the response.	
	5. Incident Command and Coordination in Difficult Environments	a. Establishes incident command in challenging environments, ensuring clear coordination between ARFFS, airport authorities, and external responders. b. Adapts the command structure and response plan to suit the operational challenges posed by the environment.	- **Skill**: Competent in leading and coordinating teams in difficult environments, ensuring efficient incident command. - **Knowledge**: Familiarity with the principles of command and control, particularly in challenging or remote locations. - **Behaviour**: Calm, adaptable, and assertive, ensuring command structures are maintained and coordination is effective despite operational challenges.	50% Theoretical 50% Practical
	6. Safe Evacuation and Casualty Management in Difficult Environments	a. Demonstrates the ability to safely evacuate personnel and manage casualties in	- **Skill**: Proficient in executing safe evacuation and casualty management procedures in difficult or hazardous environments.	40% Theoretical 60% Practical

		challenging environments, including uneven terrain and remote areas. b. Ensures that evacuation procedures account for environmental risks and that all personnel and casualties are moved to safety efficiently.	- **Knowledge**: Understanding of evacuation protocols and the specific challenges posed by rough terrain or remote locations. - **Behaviour**: Safety-focused and efficient, ensuring that all personnel and casualties are moved safely and effectively during an evacuation.	
	7. Use of Specialized Equipment for Difficult Terrain	a. Utilises specialised equipment, such as all-terrain vehicles, winches, and air support, to respond to incidents in difficult environments. b. Demonstrates proficiency in operating and maintaining equipment	- **Skill**: Competent in the use of specialised equipment for accessing and managing incidents in rough or inaccessible terrain. - **Knowledge**: Familiarity with the capabilities, limitations, and maintenance of specialised response equipment. - **Behaviour**: Confident and proficient, ensuring the correct use of equipment to	40% Theoretical 60% Practical

		used for accessing and responding in difficult terrain.	enhance response capabilities in difficult environments.	
	8. Continuous Monitoring and Adaptation During Response	a. Continuously monitors the incident environment, adjusting the response plan as needed to account for changing terrain conditions, weather, or other factors. b. Demonstrates flexibility in adapting the response strategy to ensure safety and effectiveness throughout the operation.	- **Skill**: Proficient in dynamically adjusting response plans based on evolving environmental conditions and operational challenges. - **Knowledge**: Understanding of dynamic risk assessment techniques and the ability to apply them in complex, changing environments. - **Behaviour**: Adaptable and vigilant, ensuring that the response strategy remains flexible and responsive to environmental changes.	50% Theoretical 50% Practical

Competency Unit 28: Response to Domestic Incidents at Aerodromes
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in responding to domestic incidents at aerodromes, such as fires in terminal buildings, hangars, fuel storage areas, or other facilities. This unit covers fire suppression, evacuation procedures, coordination with internal and external agencies, and the

	management of domestic incidents to ensure the safety of personnel, passengers, and infrastructure.			
Skill Development: This unit focuses on key skills such as fire suppression, evacuation management, risk assessment, and incident command. Personnel are trained to manage domestic incidents within aerodromes effectively, ensuring the safety of personnel, passengers, and infrastructure. **Behavioural Expectations:** Personnel are expected to demonstrate calmness under pressure, effective communication, and leadership throughout the incident. A proactive approach to risk assessment and hazard management is critical for ensuring the safety and success of the response. **Assessment Ratio:** Theoretical assessments focus on understanding the types of domestic incidents and the regulatory requirements for responding to such incidents. Practical assessments emphasise fire suppression techniques, evacuation procedures, and coordination with internal and external response teams.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
28: Response to Domestic Incidents at Aerodromes	1. Understanding Types of Domestic Incident at Aerodromes	a. Demonstrates a clear understanding of the types of domestic incidents that can occur at aerodromes (e.g., fires in terminal buildings, ATC tower, maintenance hangars, fuel storage areas, airside vehicles, aprons, or other facilities). b. Identifies the specific risks associated with domestic incidents in airport environments.	- **Skill**: Proficient in recognising various types of domestic incidents, including structural fires and facility hazards. - **Knowledge**: Familiarity with the common causes and types of domestic incidents, particularly in terminal buildings, hangars, and fuel storage areas. - **Behaviour**: Vigilant and knowledgeable, ensuring readiness to respond to different types of	60% Theoretical 40% Practical

			domestic incidents.	
	2. Initial Response and Incident Size-Up	a. Conducts a rapid and accurate initial size-up of the domestic incident, identifying key factors such as fire location, spread, and potential hazards. b. Ensures an immediate and coordinated response to mitigate the risk and contain the incident.	- **Skill**: Competent in performing an initial assessment of domestic incidents, focusing on immediate threats to life, property, and operations. - **Knowledge**: Understanding of size-up techniques and the critical factors that should be evaluated in the first moments of a response. - **Behaviour**: Decisive and thorough, ensuring a swift and informed assessment to guide the response.	50% Theoretical 50% Practical
	3. Fire Suppression in Domestic Incident Scenarios	a. Utilises appropriate fire suppression techniques for domestic incidents, including the use of water, foam, and dry	- **Skill**: Proficient in selecting and applying the appropriate fire suppression methods based on the nature of the fire (electrical,	40% Theoretical 60% Practical

		chemical extinguishers. b. Demonstrates proficiency in accessing and operating fire suppression systems within aerodrome buildings (e.g., sprinklers, standpipes).	structural, fuel-based). - **Knowledge**: Familiarity with fire suppression systems commonly installed in airport facilities, including their operational procedures. - **Behaviour**: Safety-conscious and methodical in applying fire suppression techniques to minimise damage and ensure rapid containment.	
	4. Evacuation and Public Safety Management	a. Coordinates the safe evacuation of passengers, staff, and other personnel from affected areas in a calm and orderly manner. b. Ensures all evacuation procedures are in line with airport	- **Skill**: Competent in managing evacuation processes during domestic incidents, ensuring the safety of all individuals on-site. - **Knowledge**: Familiarity with airport evacuation procedures, exit routes, and the	40% Theoretical 60% Practical

		safety protocols and regulatory standards.	management of large crowds under emergency conditions. - **Behaviour**: Calm and authoritative, ensuring evacuations are carried out smoothly and safely without causing panic or confusion.	
	5. Coordination with Internal and External Agencies	a. Ensures effective communication and coordination between ARFFS, airport authorities, and external responders (e.g., local fire services, medical teams) during domestic incidents. b. Establishes a clear command structure to ensure seamless collaboration and resource allocation.	- **Skill**: Proficient in coordinating multi-agency responses to domestic incidents, ensuring clear lines of communication and effective resource deployment. - **Knowledge**: Understanding of the roles and responsibilities of various internal and external agencies during aerodrome incidents. - **Behaviour**: Collaborative and communicati	50% Theoretical 50% Practical

			ve, ensuring that all responding parties are aligned and working towards the same objectives.	
	6. Risk Assessment and Hazard Management	a. Conducts ongoing risk assessments throughout the incident, identifying new hazards (e.g., smoke spread, structural collapse, fuel leaks) and adjusting the response accordingly. b. Implements hazard control measures to minimise risk to personnel and the public.	- **Skill**: Competent in conducting dynamic risk assessments during incidents to identify emerging hazards. - **Knowledge**: Awareness of hazard management techniques, including ventilation, cordoning off dangerous areas, and monitoring for secondary risks. - **Behaviour**: Vigilant and proactive in managing risks, ensuring the ongoing safety of personnel and the public during the incident.	50% Theoretical 50% Practical

	7. Incident Command and Control in Domestic Scenarios	a. Establishes incident command and maintains control of the response throughout the incident, ensuring coordination between all involved parties. b. Adjusts the command structure and resource deployment as the situation evolves.	- **Skill**: Competent in leading and managing the response to domestic incidents at aerodromes, ensuring effective command and control. - **Knowledge**: Familiarity with incident command structures and strategies for maintaining control in complex, multi-agency environments. - **Behaviour**: Decisive and organised, ensuring that all aspects of the response are coordinated and effective.	50% Theoretical 50% Practical
	8. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to review the effectiveness of the response, fire suppression efforts, and	- **Skill**: Competent in reviewing and analysing the response to domestic incidents, identifying key lessons and areas for improvement.	50% Theoretical 50% Practical

		coordination with other agencies. b. Identifies lessons learned and integrates them into future training and operational procedures.	- **Knowledge**: Understanding of debriefing procedures and how to apply lessons learned to improve future responses. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that the response to domestic incidents evolves and improves over time.	

Competency Unit 29: Response to Unlawful Interference Incidents at Aerodromes
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are equipped to respond effectively to incidents of unlawful interference at aerodromes, including hijacking, sabotage, terrorism, and unauthorised access. This unit covers threat identification, coordination with security agencies, containment, and mitigation strategies to ensure the safety of passengers, personnel, and critical infrastructure.
Skill Development: This unit develops critical skills in threat assessment, coordination with security agencies, incident command, and public safety management. Personnel are trained to manage unlawful interference incidents effectively while prioritising safety and compliance with security protocols. **Behavioural Expectations:** Personnel are expected to demonstrate strong leadership, effective communication, and adaptability in managing high-pressure situations involving unlawful interference. Vigilance, coordination, and a focus on safety are essential to the successful resolution of these incidents. **Assessment Ratio:** This unit balances theoretical understanding of ICAO Annex 17, threat identification, and coordination protocols with practical application in real-time responses to unlawful interference incidents. Theoretical assessments focus on regulatory requirements

and security protocols, while practical assessments emphasise coordination, communication, and threat mitigation.				
COMPETENCY UNIT	**COMPETENCY ELEMENT**	**PERFORMANCE CRITERIA**	**SKILL, KNOWLEDGE & BEHAVIOUR**	**ASSESSMENT RATIO**
29: Response to Unlawful Interference Incidents at Aerodromes	1. Understanding Types of Unlawful Interference	a. Demonstrates comprehensive knowledge of the different types of unlawful interference that can occur at aerodromes, such as hijacking, sabotage, bomb threats, and unauthorised access. b. Identifies the key risks and potential impact of each type of unlawful interference on aerodrome operations.	- **Skill**: Proficient in recognising various forms of unlawful interference and understanding their operational implications. - **Knowledge**: Familiarity with GCAA and other international aviation security regulations related to unlawful interference. - **Behaviour**: Vigilant and knowledgeable, ensuring readiness to respond to any form of unlawful interference.	70% Theoretical 30% Practical
	2. Initial Response and Threat Assessment	a. Conducts a rapid and accurate assessment of the situation upon receiving information	- **Skill**: Competent in quickly assessing the severity and nature of unlawful interference incidents, including	60% Theoretical 40% Practical

		about a potential unlawful interference incident. b. Identifies key factors such as the nature of the threat, its credibility, and immediate risks to life and property.	initial size-up and risk evaluation. - **Knowledge**: Understanding of threat assessment techniques and the ability to gauge the credibility of threats (e.g., bomb threats or unauthorised access). - **Behaviour**: Decisive and methodical, ensuring that threat assessments are thorough and guide appropriate responses.	
	3. Coordination with Security and Law Enforcement Agencies	a. Establishes clear communication with security agencies, law enforcement, and other relevant authorities to ensure a coordinated response. b. Ensures that ARFFS personnel follow established protocols and do not	- **Skill**: Proficient in coordinating with security and law enforcement agencies to ensure a seamless, unified response. - **Knowledge**: Familiarity with the roles and responsibilities of various agencies during	50% Theoretical 50% Practical

		interfere with security or law enforcement operations.	unlawful interference incidents and established communication protocols. - **Behaviour**: Collaborative and disciplined, ensuring ARFFS personnel work in coordination with external agencies while adhering to all security protocols.	
	4. Evacuation and Public Safety Management	a. Coordinates the safe and orderly evacuation of passengers, personnel, and other individuals from high-risk areas during unlawful interference incidents. b. Implements crowd control measures and ensures compliance with security protocols	- **Skill**: Competent in managing large-scale evacuations in response to unlawful interference incidents, prioritising public safety. - **Knowledge**: Awareness of evacuation procedures and crowd management strategies specific to high-threat scenarios. - **Behaviour**: Calm and	50% Theoretical 50% Practical

		during evacuations.	authoritative, ensuring that evacuations are carried out efficiently, minimising panic and maintaining public safety.	
	5. Incident Command and Control in Unlawful Interference Situations	a. Establishes and maintains clear incident command, ensuring coordination between ARFFS, airport security, and law enforcement agencies. b. Adapts the incident command structure based on the evolving nature of the threat and the response required.	- **Skill**: Proficient in leading and managing the response to unlawful interference incidents at aerodromes, ensuring effective incident command. - **Knowledge**: Understanding of incident command structures and the specific coordination required during high-threat situations. - **Behaviour**: Decisive and adaptive, ensuring that command and control structures are maintained	50% Theoretical 50% Practical

			and adjusted as needed to manage the response effectively.	
	6. Risk Mitigation and Hazard Control	a. Implements appropriate risk mitigation measures to contain the threat posed by unlawful interference incidents, such as establishing cordons, isolating high-risk areas, and protecting critical infrastructure. b. Conducts dynamic risk assessments throughout the incident, adjusting mitigation strategies as the situation evolves.	- **Skill**: Competent in managing risks and implementing hazard control measures during unlawful interference incidents, ensuring the safety of personnel and infrastructure. - **Knowledge**: Familiarity with risk management techniques specific to security incidents, including dynamic risk assessment and containment strategies. - **Behaviour**: Vigilant and proactive in identifying and mitigating emerging risks, ensuring the safety of all	50% Theoretical 50% Practical

			responders and civilians.	
	7. Communication with Stakeholders and the Public	a. Ensures clear and timely communication with airport management, government authorities, and the public regarding the nature of the incident and the steps being taken. b. Coordinates with the airport's public information officer to ensure accurate and consistent messaging.	- **Skill**: Proficient in managing communication with internal and external stakeholders during unlawful interference incidents. - **Knowledge**: Awareness of communication protocols for security incidents, ensuring that messaging is accurate, timely, and coordinated. - **Behaviour**: Transparent and authoritative, ensuring clear communication with all stakeholders while maintaining operational security.	50% Theoretical 50% Practical
	8. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to review the effectiveness of the	- **Skill**: Competent in reviewing the response to unlawful interference incidents and	50% Theoretical 50% Practical

		response to the unlawful interference incident. b. Identifies lessons learned and integrates them into future training and operational procedures to improve response readiness.	identifying areas for improvement. - **Knowledge**: Understanding of debriefing procedures and how to apply lessons learned to enhance future responses. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that the response to future unlawful interference incidents is optimised.	

Competency Unit 30: Response to Medical Emergencies at Aerodromes
This competency unit ensures ARFFS (Aircraft Rescue and Firefighting Services) personnel are proficient in responding to medical incidents and public health emergencies at aerodromes, including first aid, casualty management, and the containment of infectious diseases or other health-related crises. This unit covers emergency medical response, coordination with healthcare providers, and the application of public health protocols to ensure safety and well-being at the aerodrome.
Skill Development: This unit develops critical skills in medical assessment, first aid, public health emergency management, and coordination with medical teams and public health authorities. Personnel are trained to respond effectively to medical incidents and public health emergencies, ensuring safety and compliance with international guidelines.

Behavioural Expectations: Personnel are expected to demonstrate calmness, effective communication, and leadership during medical emergencies. A proactive approach to public health risks and a commitment to safety and compliance are essential.

Assessment Ratio: This unit balances theoretical knowledge of medical and public health response protocols with practical application, focusing on immediate medical interventions, communication with health authorities, and public safety management. Theoretical assessments focus on understanding health regulations, while practical assessments emphasise medical response, evacuation, and containment procedures.

COMPETENCY UNIT	COMPETENCY ELEMENT	PERFORMANCE CRITERIA	SKILL, KNOWLEDGE & BEHAVIOUR	ASSESSMENT RATIO
30: Response to Medical Emergencies at Aerodromes	1. Understand Medical Incident Types and Public Health Emergencies	a. Demonstrates a clear understanding of the types of medical incidents and public health emergencies that may occur at aerodromes (e.g., cardiac arrest, communicable diseases, mass casualty incidents). b. Identifies the risks associated with medical and public health emergencies within the aerodrome environment.	- **Skill**: Proficient in recognising various types of medical incidents and health emergencies, including identifying symptoms and risk factors. - **Knowledge**: Familiarity with ICAO and national guidelines for responding to medical incidents and health emergencies at aerodromes. - **Behaviour**: Vigilant and proactive, ensuring preparedness to respond to medical and public health	60% Theoretical 40% Practical

			emergencies.	
	2. Initial Response and Medical Assessment	a. Conducts a rapid and accurate assessment of the medical emergency, identifying the severity and nature of the incident (e.g., life-threatening conditions, infectious diseases). b. Ensures immediate medical intervention and notifies relevant medical teams and public health authorities.	- **Skill**: Competent in assessing medical incidents quickly, including triage and immediate response. - **Knowledge**: Understanding of basic medical assessment techniques, including vital signs checks, triage protocols, and initial intervention strategies. - **Behaviour**: Decisive and composed, ensuring accurate assessments guide the response to medical emergencies.	50% Theoretical 50% Practical
	3. First Aid and Casualty Management	a. Administers appropriate first aid and basic life support (BLS) techniques, including CPR, AED usage, wound managemen	- **Skill**: Proficient in delivering first aid and life-saving interventions for a wide range of medical emergencies. - **Knowledge**:	40% Theoretical 60% Practical

		t, and stabilisation of casualties. b. Demonstrates the ability to manage multiple casualties during mass casualty incidents.	Familiarity with first aid protocols, resuscitation techniques, and mass casualty management. - **Behaviour**: Calm and methodical, ensuring first aid is delivered effectively and casualties are prioritised based on their medical condition.	
	4. Public Health Emergency Response	a. Implements public health protocols, including quarantine procedures, isolation of infected individuals, and coordination with public health authorities. b. Ensures compliance with national and international public health guidelines,	- **Skill**: Competent in executing public health emergency response protocols, including managing infectious disease outbreaks. - **Knowledge**: Awareness of public health emergency response procedures, including quarantine, isolation, and infection	60% Theoretical 40% Practical

		including those set by the GCAA, WHO and ICAO.	control. - **Behaviour**: Safety-conscious and compliant, ensuring that all public health protocols are followed to prevent the spread of disease.	
	5. Communication and Coordination with Medical and Public Health Authorities	a. Establishes clear communication with on-site medical teams, airport health officials, and external public health authorities. b. Ensures accurate and timely information flow between ARFFS, medical responders, and public health officials.	- **Skill**: Proficient in coordinating with medical and public health authorities to ensure a unified response. - **Knowledge**: Familiarity with communication protocols for medical incidents and public health emergencies, including reporting procedures to national and international health bodies. - **Behaviour**: Collaborative and communicative, ensuring seamless	50% Theoretical 50% Practical

			coordination with all relevant stakeholders.	
	6. Evacuation and Containment Procedures	a. Implements evacuation protocols for affected individuals or areas of the aerodrome during medical or public health emergencies. b. Ensures that containment measures are established to limit the spread of infectious diseases or other hazards.	- **Skill**: Competent in executing evacuation and containment procedures to protect public health. - **Knowledge**: Understanding of evacuation routes, containment strategies, and public health regulations that should be applied during health emergencies. - **Behaviour**: Decisive and safety-conscious, ensuring the protection of all personnel and passengers during evacuation and containment efforts.	50% Theoretical 50% Practical
	7. Use of Personal Protective	a. Utilises appropriate personal	- **Skill**: Proficient in selecting, donning,	50% Theoretical

	Equipment (PPE)	protective equipment (PPE) to protect against exposure to infectious diseases or hazardous materials during medical and public health emergencies. b. Ensures that all responding personnel are equipped with and properly trained in the use of PPE.	and using PPE to ensure the safety of responders during public health emergencies. - **Knowledge**: Familiarity with different types of PPE, including masks, gloves, gowns, and respiratory protection, and their application in various emergency scenarios. - **Behaviour**: Safety-focused and meticulous, ensuring the correct use of PPE to minimise health risks.	50% Practical
	8. Post-Incident Review and Continuous Improvement	a. Participates in post-incident debriefings to review the response to medical incidents and public health emergencies. b. Identifies	- **Skill**: Competent in analysing medical and public health emergency responses, identifying areas for improvement. - **Knowledge**: Understanding of	50% Theoretical 50% Practical

		lessons learned and integrates them into future training and operational protocols to improve response readiness.	debriefing processes and how to apply lessons learned to enhance future responses. - **Behaviour**: Reflective and committed to continuous improvement, ensuring that medical response capabilities are continuously refined.	

GM2 AMC4 TRG.OR.D.005 Structured learning programme for low category aerodrome ARFFS personnel

STRUCTURED LEARNING PROGRAMME FOR LOW CATEGORY AERODROME ARFFS PERSONNEL

Table-7 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS operational personnel employed at a low category aerodrome in the United Arab Emirates.

Table-86: Structured learning programme for low category aerodrome ARFFS personnel

Structured learning programme for low category aerodrome ARFFS personnel
Aim • The aim of the structured learning programme is to train new ARFFS firefighters and to provide refresher for current firefighters employed at low category aerodrome in both the technical and practical skills for the effective deployment to deal with an aircraft incident utilising the ‘safe person concept’. Attendance Criteria

- Candidates should attend this SLP before they operate as a competent ARFFS firefighter or as a refresher for current ARFFS firefighters
- Candidates should be accepted medically and physically fit by an accepted occupational medical person or provider.
- A minimum of 80% attendance is eligible for an award of certificate of competence.

Pre-Study

- Whilst there are no pre-course study requirements, any knowledge of RFF service operations will assist with this intensive programme. If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Technical Contents

- Dynamic risk assessment
- Safe person concept
- Fire service equipment, technical information and practical use
- Words of command
- Manual handling
- Fire behaviour and toxicity
- Occupational medical first aid and cardiopulmonary resuscitation
- Aircraft construction
- Fuels and fuel tanks
- Firefighting tactics and techniques
- Radio communication procedures
- Emergency planning
- Breathing apparatus use and control procedures
- Drive and operate a fire vehicle safely
- Case studies
- Search techniques
- Practical exercises

Delivery Method

- The SLP should be heavily biased to practical mentored instruction. Clear, concise and relevant notes should be provided to underpin the subject areas with the emphasis on practical acquisition and development of skills.

- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered.

Assessments

- Written, oral and practical assessments against the requirements should be carried out and recorded.

Length of Course

- A minimum of 80 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, a certificate of competence should be issued with a validity of three years, during which continued competence and regular proficiency checks should be maintained.

GM3 AMC4 TRG.OR.D.005 Structured learning programme for low category aerodrome ARFFS supervisors

Structured learning programme for low category aerodrome ARFFS supervisors

(a) Table-8 provides minimum training syllabus to training providers in delivering structured learning programmes for aerodrome rescue and firefighting supervisors employed at a low category aerodrome in the United Arab Emirates.

Table-87: Structured learning programme for low category aerodrome ARFFS supervisors

STRUCTURED LEARNING PROGRAMME FOR LOW CATEGORY Aerodrome ARFFS SUPERVISORs
Aim • The aim of this structured learning programme is to allow potential/new and current supervisors to develop and maintain the skills necessary to manage a ARFFS unit at a low category aerodrome in the United Arab Emirates. Attendance Criteria • Candidates should attend this programme before they operate in a supervisory role, within 3-months after they take up a supervisory role or as part of refresher training. • Candidates should possess valid low category aerodrome firefighter qualifications or equivalent • Candidates should be accepted medically and physically fit by an accepted occupational medical person or provider.

- A minimum of 80% attendance is eligible for an award of certificate of competence.

Pre-Study

The following is a pre-course requirement:

- Knowledge of GCAA low category aerodrome regulations.

Technical Content

- GCAA low category aerodrome regulations.
- Training supervision and management
- Tactics and techniques for aircraft incidents
- Incident Command System
- Management of media, equipment, vehicles, procedures and records
- Hazard identification and risk assessment
- Case studies

Delivery Method

- The course should cover the technical content in the classroom followed by the application of tactics and techniques and their supervision by practical exercises.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered.

Assessments

- Written and practical assessments against the requirements should be carried out and recorded.

Length of Course

- A minimum of 40 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of the SLP, a certificate of competence is issued with a validity of three years, during which continued competence training and regular proficiency checks should be maintained.

GM4 AMC4 TRG.OR.D.005 Structured learning programme for certificated aerodrome ARFFS firefighters

STRUCTURED LEARNING PROGRAMME FOR CERTIFICATED AERODROME ARFFS FIREFIGHTERS

Table-9 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS fire fighters employed at an aerodrome in the United Arab Emirates.

Table-88: Structured learning programme for certificated aerodrome ARFFS firefighters

Structured Learning Programme for certificated Aerodrome ARFFS Firefighters
Aim • The aim of this SLP is to provide candidates with opportunities to acquire skills and knowledge appropriate for their role and stage of development. • The skills and knowledge that can be acquired during the Firefighter Initial programme have been mapped to the GCAA Aerodrome rescue and firefighting Service requirements. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of aerodrome firefighter through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme. • Be accepted medically and physically fit in accordance to GCAA ARFFS fitness requirements. • A minimum of 80% attendance is eligible for an award of certificate of competence. Pre-Study • Whilst there are no pre-course study requirements, any knowledge of fire service operations will assist with this intensive programme. • If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects. Technical Contents <u>Module 1 - Basic Firemanship</u> • Fire Behaviour and Science - Physics and Chemistry • Extinguishing agents and extinction methods – principal and complementary agents • Manual Handling – fire service hoses, branches/nozzles, ladders & equipment. • Teamwork • Words of Command • Fire Service Drills • Operational Communications • Inspection and Testing of Fire Service Equipment • Water supply and hydraulics • Pumps and Primers • Fitness

- Personal safety

Module 2 - Foundation of Breathing Apparatus

- General Check and Don & Start-up
- Safe use of Breathing Apparatus
- Physiology of Respiration
- Breathing apparatus Cylinders
- Breathing apparatus operational procedures
- Search and rescue procedures
- Entanglement procedures
- Compartment fire behaviour training

Module 3 - Incident command awareness

- Foundation of Incident Command
- Introduction to JESIP

Module 4 - Aviation

- GCAA regulatory Framework
- Aerodrome knowledge
    - Aerodrome familiarisation – terminal, cargo, ATC, fuel storage/farm, hangar, etc
    - Airfield layout
    - Emergency access roads including 1 000 m response area and crash gates
    - Off-airport incidents
    - Managing passenger evacuation into airside - aircraft and building
- Aircraft knowledge
    - Aircraft Construction
    - Aircraft Fuels and Fuel Tanks
    - Aircraft Undercarriages
    - Aircraft Engines
    - Aircraft Internal Fires
    - Helicopters
    - Military Aircraft
    - Freight Aircraft
    - Aircraft Extrication & Flight Deck Secure Doors
    - Aircraft Firefighting Tactics and Techniques
    - Post Incident Consideration

- Preservation of evidence
- Post-Accident Investigation

Module 5 - Auxiliary Modules

- Working at height
- Hazardous Materials
- Water rescue

Module 6 – Practical Exercises/Drills

- Case studies
- Search and rescue techniques
- Practical firefighting exercises/drills
- Fitness exercises

Delivery Method

- The SLP should be heavily biased to practical mentored instruction. Clear, concise and relevant notes should be provided to underpin the subject areas with the emphasis on practical acquisition and development of skills.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered.

Assessments

- Written, oral and practical assessments against the requirements should be carried out and recorded.

Length of Course

- A minimum of 320 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, a certificate of competence should be issued with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM5 AMC4 TRG.OR.D.005 Structured learning programme for certificated aerodrome ARFFS driver operators

STRUCTURED LEARNING PROGRAMME FOR CERTIFICATED AERODROME ARFFS DRIVER OPERATOR

Table-10 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS driver operator employed at an aerodrome in the United Arab Emirates.

Table-89: Structured learning programme for certificated aerodrome ARFFS driver operators

Structured learning programme for certificated aerodrome ARFFS driver operators
Aim • The aim of this SLP is to provide candidates with opportunities to acquire skills and knowledge appropriate for their role and stage of development. • The skills and knowledge that can be acquired during the Driver Operator Initial programme are mapped against GCAA Aerodrome rescue and firefighting Service requirements. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of aerodrome ARFFS driver operator through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme. • Possess a valid UAE heavy vehicle driving license • Possess a valid airfield driving permit • Be accepted medically and physically fit in accordance to GCAA ARFFS Fitness requirements. • A minimum of 80% attendance is eligible for an award of certificate of competence. Pre-Study • Whilst there are no pre-course study requirements, any knowledge of RFF service operations will assist with this intensive programme. If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects. Technical Contents <u>Module 1 – Vehicle familiarisation</u> • Perform vehicle checking and inspection • Demonstrate understanding of all driving control system • Demonstrate understanding of all firefighting systems • Demonstrate understanding of monitors, HRET, sidelines, etc. <u>Module 2 - Demonstrate basic driving skills</u> • Correctly manage hazards using various observational skills, with safe and accurate use of all vehicle controls

- Make suitable progress while positioning the vehicle safely and correctly, in relation to the circumstances
- Select suitable places to park, reverse and manoeuvre the vehicle and correctly carry out the required actions

Module 3 - Prepare to drive vehicles at high speed

- Show knowledge of the vehicle controls
- Correctly complete vehicle checks
- Identify and take the correct actions for any defects
- Ensure the vehicle is fit for purpose before and after use
- Keep accurate vehicle documentation relating to vehicle use
- Relevant road traffic laws, regulations and Highway Code provisions
- Physiological and psychological factors relevant to safe driving
- Legal and safety requirements of operating in-vehicle technology

Module 4 - Undertake an emergency response driving

- Ensure that the level of the response is proportionate, necessary, safe and accountable, and that the use of legal exemptions is lawful and justifiable
- Consistently able to undertake safe and systematic simulated response drives, claiming legal exemptions in a range of road environments and in line with service policies

Module 5 - Avoid and correct skids when driving an emergency vehicle

- Identify the causes and types of skids
- Drive the vehicle in a manner that maximises vehicle stability and minimises the risk of skidding
- Understand the appropriate corrective action to take, based on the type of vehicle being driven
- Understand the types of safety devices fitted to vehicles and why they activate

Module 6 – Practical Exercises/Drills

- Case studies
- Day and night practical driving skills
- Practical firefighting exercises/drills

Delivery Method

- The SLP should be heavily biased to practical mentored instruction. Clear, concise and relevant notes should be provided to underpin the subject areas with the emphasis on practical acquisition and development of skills.

• Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered. Assessments • Written, oral and practical assessments against the requirements should be carried out and recorded. Length of Course • A minimum of 80 instructional hours (excluding breaks, assessment and additional training hours). Validity • Upon successful completion of this SLP, a certificate of competence should be issued with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM6 AMC4 TRG.OR.D.005 Structured learning programme for certificated aerodrome ARFFS watchroom officers

STRUCTURED LEARNING PROGRAMME FOR AERODROME ARFFS WATCHROOM OFFICERS

Table-11 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS watchroom operators employed at an aerodrome in the United Arab Emirates.

Table-90: Structured learning programme for certificated aerodrome ARFFS watchroom operators

Structured learning programme for certificated aerodorme ARFFS watchroom operators
Aim • The aim of this SLP is to provide candidates with opportunities to acquire skills and knowledge appropriate for their role and stage of development. • The skills and knowledge that can be acquired during the Watchroom Attendant Initial programme are mapped against GCAA Aerodrome rescue and firefighting Service requirements. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of aerodrome ARFFS watchroom attendant through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme.

- Be accepted medically and physically fit in accordance to GCAA ARFFS Fitness requirements.
- A minimum of 80% attendance is eligible for an award of certificate of competence.

Pre-Study

- Whilst there are no pre-course study requirements, any knowledge of fire service operations will assist with this intensive programme.
- If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Technical Contents

- Demonstrate written and spoken Aviation English language
- Demonstrate understanding and use of aerodrome radiotelephony communication language and equipment
- Familiarise with a fire station watchroom system and its peripherals
- Familiarise with aerodrome layout and facilities
- Demonstrate understanding of incident management system
- Demonstrate understanding of aerodrome emergency notification and mobilisation procedures
- Demonstrate understanding of aerodrome emergency planning arrangements
- Demonstrate ability to record and maintain a watchroom occurrence log.
- Demonstrate ability to write an incident report

Delivery Method

- The SLP should be heavily biased to practical mentored instruction. Clear, concise and relevant notes should be provided to underpin the subject areas with the emphasis on practical acquisition and development of skills.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered.

Assessments

- Written, oral and practical assessments against the requirements should be carried out and recorded.

Length of Course

- A minimum of 60 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, a certificate of competence should be issued with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM7 AMC4 TRG.OR.D.005 Structured learning programme for certificated aerodrome ARFFS supervisors

STRUCTURED LEARNING PROGRAMME FOR CERTIFICATED AERODROME ARFFS SUPERVISORS

Table-12 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS supervisors employed at an aerodrome in the United Arab Emirates.

Table-91: Structured learning programme for certificated aerodrome ARFFS supervisors

Structured learning programme for certificated aerodrome ARFFS supervisors
Aim • The aim of this SLP is designed for personnel who will undertake the responsibility of ARFFS Supervisors at an aerodrome. It provides instruction in operational command and control principles and the day-to-day management requirements of the Aerodrome rescue and firefighting Service (ARFFS). • The skills and knowledge that can be acquired during the Supervisor Initial programme have been mapped to the GCAA Aerodrome rescue and firefighting Service requirements. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of aerodrome ARFFS supervisors through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme. • A minimum of two years operational experience serving as a competent firefighter/driver or as per organisational policies. • Be accepted medically and physically fit in accordance to GCAA ARFFS Fitness requirements. • A minimum of 80% attendance is eligible for an award of certificate of competence. Pre-Study

- Operational knowledge of RFF service operations is essential and will assist with this intensive programme.
- If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Technical Contents

- Demonstrate understanding of GCAA regulatory legislative framework on ARFFS provision
- Demonstrate leading the work of teams and individuals to achieve their objectives
- Demonstrate maintaining activities to meet requirements
- Demonstrate managing information for action
- Demonstrate planning and contributing to the development of teams and individuals
- Demonstrate leading and supporting people to resolve operational incidents
- Demonstrate understanding aerodrome emergency planning arrangements
- Demonstrate operational incident command competence
- Demonstrate investigating and reporting events to inform future practice
- Demonstrate understanding and planning operational training
- Demonstrate understanding of an aerodrome fire prevention programme

Delivery Method

- The course should cover the technical content in the classroom followed by the application of tactics and techniques and their supervision by practical exercises.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical and practical knowledge can be considered.

Assessments

- Candidates will be assessed through written, oral questioning and observation of performance in a simulated incident command role

Length of Course

- A minimum of 80 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, candidates will be issued with certificate of competence with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM8 AMC4 TRG.OR.D.005 Structured learning programme for certificated aerodrome ARFFS managers

STRUCTURED LEARNING PROGRAMME FOR CERTIFICATED AERODROME ARFFS MANAGERS

Table-13 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS managers employed at an aerodrome in the United Arab Emirates.

Table-92: Structured learning programme for certificated aerodrome ARFFS managers

Structured learning programme for certificated aerodrome ARFFS managers
Aim • The aim of this SLP is designed for personnel who will undertake the responsibility of ARFFS Managers. It provides instruction in overall management requirements of the Aerodrome rescue and firefighting Service (ARFFS) and command and control at tactical level. • The skills and knowledge that can be acquired during the Manager Initial programme have been mapped to the GCAA Aerodrome rescue and firefighting Service requirements. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of aerodrome ARFFS managers through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme. • Completed an Aerodrome-accepted ARFFS Supervisor course or equivalent • A minimum of three years operational experience as a competent ARFFS station commander or as per organisational policies • Be accepted medically and physically fit in accordance to GCAA ARFFS Fitness requirements. • A minimum of 80% attendance is eligible for an award of certificate of competence. Pre-Study • Extensive knowledge of RFF service management and operations is essential and will assist with this intensive programme. • If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects. Technical Contents • Demonstrate leading, monitoring and supporting people to resolve operational incidents

- Demonstrate ability to determine solutions to hazards and risks identified through inspection and investigation
- Demonstrate planning and implementing activities to meet service delivery needs
- Demonstrate managing the effective use of resources
- Demonstrate managing the performance of teams and individuals to achieve objectives
- Demonstrate ability to develop teams and individuals to enhance work-based performance
- Demonstrate ability to provide information to support decision making
- Demonstrate understanding of aerodrome emergency planning inter and intra operability
- Demonstrate ability to perform at or support tactical incident command competence level
    - Understand a tactical approach to leading monitoring and supporting people to resolve operational incidents
    - Understand the principles of risk management when leading, monitoring and supporting people to resolve operational incidents
    - Understand the principles of debriefing following an operational incident
    - Be able to evaluate the status of an operational incident
    - Be able to assume responsibility for action to support those involved in an operational incident
    - Be able to close down the operational phase in an incident
    - Understand collaboration in resolving major incidents
    - Undertake the role of command support at Tactical (Silver) level at multi-agency incidents
- Demonstrate ability in planning and managing a ARFFS training programme
- Demonstrate ability in planning and managing an aerodrome fire prevention programme

Delivery Method

- The course should cover the technical content in the classroom followed by the application of tactics and techniques and their supervision by practical exercises.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical and practical knowledge can be considered.

Assessments

- Candidates will be assessed through written, oral questioning and observation of performance in a simulated command role

Length of Course

- A minimum of 60 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, candidates will be issued with certificate of competence with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM9 AMC4 TRG.OR.D.005 Structured learning programme for LAA aerodrome ARFFS personnel

STRUCTURED LEARNING PROGRAMME FOR LANDING AREA ACCEPTANCE AERODROME ARFFS PERSONNEL

Table-14 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS personnel employed at landing area acceptance aerodrome in the United Arab Emirates.

Table-93: Structured learning programme for LAA aerodrome ARFFS personnel

Structured learning programme for landing area acceptance aerodrome ARFFS personnel
Aim • The aim of the structured learning programme is to train new ARFFS operational personnel and to provide refresher for current personal employed at landing area acceptance aerodrome in both the technical and practical skills for the effective deployment to deal with an aircraft incident utilising the ‘safe person concept’. • This SLP focuses on critical modules essential for ARFFS personnel at landing area acceptance aerodromes, designed for completion over 6 weeks, with 8 hours of instructions per weekday. Attendance Criteria • Candidates should attend this SLP before they operate as a competent ARFFS firefighter or as a refresher for current ARFFS firefighters • Candidates should be accepted medically and physically fit by an accepted occupational medical person or provider. • A minimum of 80% attendance is eligible for an award of certificate of competence. Pre-Study

- Whilst there are no pre-course study requirements, any knowledge of RFF service operations will assist with this intensive programme. If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Program Structure and Modules

Module 1: Firefighting Fundamentals

- Fire Science Basics: Understanding fire behaviour.
- Suppression Techniques: Use of various fire suppression agents.
- Firefighting Equipment: Operation, maintenance, and safety.
- Practical Exercises: Conducting drills with different fire scenarios.

Module 2: Aircraft Rescue Techniques

- Aircraft Structure and Access: Techniques for gaining access to aircraft during emergencies.
- Evacuation Procedures: Safe methods for evacuating passengers and crew.
- Hazardous Materials Handling: Managing dangerous substances found in aircraft.
- Practical Drills: Simulated rescue operations.

Module 3: Medical Response and First Aid

- Basic First Aid: Addressing aviation-specific injuries, such as burns and fractures.
- Triage and Casualty Management: Prioritising and managing multiple casualties.
- Emergency Medical Services Coordination: Working effectively with local EMS.
- Hands-On Practice: Realistic medical scenarios.

Module 4: Emergency Response Planning

- Developing Response Plans: Tailoring emergency response plans to specific aerodromes.
- Risk Assessment: Identifying and mitigating potential hazards.
- Scenario Planning: Creating and practising response scenarios.
- Practical Drills: Execution of emergency response plans.

Module 5: Communication and Coordination

- Communication Protocols: Effective use of communication tools during emergencies.
- Teamwork and Leadership: Managing teams and making decisions under pressure.
- Interagency Coordination: Working with other emergency services and aerodrome personnel.
- Simulation Exercises: Practising communication and coordination in simulated scenarios.

Delivery Method

- The SLP should be heavily biased to practical mentored instruction. Clear, concise and relevant notes should be provided to underpin the subject areas with the emphasis on practical acquisition and development of skills.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical knowledge can be considered.

Assessments

- Written, oral and practical assessments against the requirements should be carried out and recorded.

Length of Course

- A minimum of 240 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, a certificate of competence should be issued with a validity of three years, during which continued competence and regular proficiency checks should be maintained.

GM10 AMC4 TRG.OR.D.005 Structured learning programme for LAA aerodrome ARFFS supervisors

STRUCTURED LEARNING PROGRAMME FOR LANDING AREA ACCEPTANCE AERODROME ARFFS SUPERVISORS

Table-15 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS supervisors employed at landing area acceptance aerodrome in the United Arab Emirates.

Table-94: Structured learning programme for LAA aerodrome ARFFS supervisors

Structured learning programme for landing area acceptance aerodrome ARFFS supervisors
Aim • The aim of this SLP is designed to develop ARFFS supervisors' leadership, strategic, and operational skills, enabling them to manage their teams effectively during emergencies at landing area acceptance aerodromes. By focusing on key subject areas, the SLP ensures that supervisors are well-prepared to handle the challenges of their roles, maintaining safety and compliance at all times. Attendance Criteria

- Candidates nominated to attend this SLP will have been selected for the role of aerodrome ARFFS supervisors. This programme ensures that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme.
- Completed a landing area acceptance aerodrome ARFFS operational personnel course or equivalent
- A minimum of two years operational experience serving as a competent ARFFS operational personnel or as per organisational policies.
- Candidates should be accepted medically and physically fit by an accepted occupational medical person or provider.
- A minimum of 80% attendance is eligible for an award of certificate of competence.

Pre-Study

- Extensive knowledge of RFF service management and operations is essential and will assist with this intensive programme.
- If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Program Structure and Modules

Module 1: Advanced Firefighting Tactics and Strategy (80 weeks)

- Fire Behaviour Analysis: In-depth understanding of complex fire scenarios.
- Fire Suppression Strategy and Tactics: Developing and implementing advanced suppression tactics.
- Resource Management: Efficient use of personnel and equipment during firefighting operations.
- Initial Incident Command: Role and responsibilities of a supervisor in managing firefighting operations.
- Practical Exercises: Scenarios focused on strategic decision-making in firefighting situations.

Module 2: Leadership and Team Management (60 hours)

- Leadership Skills: Developing leadership qualities crucial for ARFFS supervision.
- Team Dynamics: Understanding and managing team behaviour and morale.
- Decision-Making Under Pressure: Techniques for making sound decisions in high-stress situations.
- Conflict Resolution: Handling disputes and ensuring team cohesion during operations.

- Simulation Exercises: Leadership scenarios to practice and refine management skills.

Module 3: Emergency Planning and Risk Management (40 hours)

- Emergency Plan Development: Creating and implementing aerodrome-specific emergency plans.
- Risk Assessment and Mitigation: Identifying, assessing, and mitigating risks at non-certificated aerodromes.
- Crisis Management: Supervising the response to large-scale incidents and coordinating with external agencies.
- Practical Planning Exercises: Developing and testing emergency response plans in simulated environments.

Module 4: Communication and Interagency Coordination (40 hours)

- Advanced Communication Techniques: Enhancing communication skills for effective leadership.
- Coordination with External Agencies: Working with local emergency services, law enforcement, and other relevant agencies.
- Interagency Drills: Coordinated exercises with other agencies to practice communication and joint operations.

Module 5: Regulatory Compliance and Reporting (20 hours)

- Understanding Regulations: Knowledge of local and international regulations relevant to non-certificated aerodromes.
- Compliance Strategies: Ensuring that ARFFS operations comply with regulatory requirements.
- Incident Reporting: Accurate and timely reporting of incidents and actions taken.
- Audit Preparation: Preparing for audits and inspections by regulatory bodies.

Delivery Method

- The course should cover the technical content in the classroom followed by the application of tactics and techniques and their supervision by practical exercises.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical and practical knowledge can be considered.

Assessments

- Candidates will be assessed through written, oral questioning and observation of performance in a simulated command role

Length of Course

• A minimum of 240 instructional hours (excluding breaks, assessment and additional training hours). Validity • Upon successful completion of this SLP, candidates will be issued with certificate of competence with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM11 AMC4 TRG.OR.D.005 Structured learning programme for LAA aerodrome ARFFS managers

STRUCTURED LEARNING PROGRAMME FOR LANDING AREA ACCEPTANCE AERODROME ARFFS MANAGERS

Table-16 provides minimum training syllabus to training providers in delivering structured learning programmes for ARFFS managers employed at landing area acceptance aerodrome in the United Arab Emirates.

Table-95: Structured learning programme for LAA aerodrome ARFFS managers

Structured learning programme for landing area acceptance aerodrome ARFFS managers
Aim • The aim of this SLP is designed to equip Aerodrome rescue and firefighting Services (ARFFS) managers at landing area acceptance aerodromes with the advanced skills and knowledge necessary to oversee and enhance ARFFS operations. The program focuses on key managerial competencies, including leadership, strategic planning, and regulatory compliance. Attendance Criteria • Candidates nominated to attend this SLP will have been selected for the role of landing area acceptance aerodrome ARFFS managers through a rigorous recruitment programme. This programme should ensure that the candidate has the capacity to absorb technical information and the physical capability to participate in all practical aspects of the programme. • Completed a landing area acceptance ARFFS Supervisor course or equivalent • A minimum of three years operational experience serving as a competent ARFFS supervisor or as per organisational policies. • Candidates should be accepted medically and physically fit by an accepted occupational medical person or provider.

- A minimum of 80% attendance is eligible for an award of certificate of competence.

Pre-Study

- Extensive knowledge of RFF service management and operations is essential and will assist with this intensive programme.
- If candidates are able to carry out pre-study, they should concentrate on study notes covering the technical subjects.

Program Structure and Modules

Module 1: Leadership and Management (80 hours)

- Leadership in Crisis: Strategies for leading ARFFS teams during high-pressure situations.
- Management Principles: Key concepts in managing teams, resources, and operations effectively.
- Vision and Strategy Development: Crafting a long-term vision for ARFFS operations and aligning team efforts.
- Decision-Making Frameworks: Approaches to making informed and strategic decisions under pressure.
- Case Studies: Analysis of real-world incidents and the application of leadership strategies.

Module 2: Advanced Emergency Planning and Risk Management (60 hours)

- Comprehensive Emergency Planning: Developing robust emergency response plans tailored to non-certificated aerodromes.
- Risk Management Strategies: Identifying, assessing, and mitigating risks at a managerial level.
- Crisis Management Coordination: Leading large-scale emergency responses and coordinating with multiple agencies.
- Business Continuity Planning: Ensuring operational resilience and recovery post-incident.
- Practical Workshops: Developing and testing emergency plans through tabletop exercises and simulations.

Module 3: Regulatory Compliance and Organisational Governance (40 hours)

- Regulatory Frameworks: Understanding the legal and regulatory environment governing ARFFS operations.
- Compliance Management: Strategies for ensuring all operations meet regulatory requirements.
- Organisational Governance: Implementing governance structures that support compliance and ethical operations.

- Audit and Inspection Preparedness: Preparing for and managing external audits and inspections.
- Reporting and Documentation: Best practices for incident reporting, record-keeping, and communication with regulatory bodies.

Module 4: Resource Management and Operational Efficiency (40 hours)

- Human Resource Management: Recruiting, training, and retaining skilled ARFFS personnel.
- Financial Management: Budgeting and financial oversight for ARFFS operations.
- Operational Efficiency: Optimising the use of equipment, technology, and other resources.
- Supply Chain and Logistics: Managing the logistics of equipment and supplies to ensure readiness.
- Continuous Improvement: Implementing processes for ongoing operational improvement.

Module 5: Stakeholder Engagement and Public Relations (20 hours)

- Stakeholder Mapping: Identifying and prioritising key stakeholders in ARFFS operations.
- Engagement Strategies: Building and maintaining relationships with internal and external stakeholders.
- Community Engagement: Developing programs that enhance community safety and awareness.
- Crisis Communication: Best practices for communicating during an emergency, ensuring clarity and trust.

Delivery Method

- The course should cover the technical content in the classroom followed by the application of tactics and techniques and their supervision by practical exercises.
- Blended learning delivery method and use of virtual reality simulations to demonstrate mastery of theoretical and practical knowledge can be considered.

Assessments

- Candidates will be assessed through written, oral questioning and observation of performance in a simulated command role

Length of Course

- A minimum of 240 instructional hours (excluding breaks, assessment and additional training hours).

Validity

- Upon successful completion of this SLP, candidates will be issued with certificate of competence with a validity of four years, during which continued competence and regular proficiency checks should be maintained.

GM12 AMC4 TRG.OR.D.005 Direct entry personnel

Direct entry personnel

(a) Direct entry scheme

(1) Direct entry is used as a mechanism to fill ARFFS operational, supervisory and managerial grades by attracting external candidates who possess sought after and valuable management and leadership skills; this approach can run alongside the development of internal employees to managerial roles and transfers in from other aerodrome rescue and firefighting services or non-aerodrome fire rescue services.

(2) Direct Entry can be an effective way to help increase current talent pool by allowing candidates to enter the organisation at a higher operational level than the entry level role of a Firefighter, any predicted shortages in supervisors and managers that are identified through workforce planning activities, can help to be addressed.

(3) Direct entry can, therefore, be used as part of recruitment policies and procedures to positively impact and support the aerodrome operator's ability to deliver its strategic aims. Where training providers do not have the appropriate aerodrome rescue and firefighting service experience, an initial assessment should be conducted to determine role suitability. Once selected, sector related knowledge and skills can be acquired through an intensive training and development programme.

(4) Careful consideration should be given to training providers who have not been maintaining their competencies or trying to join the fire rescue industry after long absence. Where their competence are in doubt, these training providers should attend full structured learning programmes appropriate to the role they are applying for.

(5) Personnel recruited or selected via direct entry scheme should be meet the competency standards appropriate to the grades detailed in this regulation.

(b) Career advancements

(1) All grades of ARFFS personnel should re-qualify by competence assessments following attendance on further courses appropriate to their grades. Candidates with long-term

career prospects should be encouraged to undertake more advanced training to prepare them for their future grades.

GM13 AMC4 TRG.OR.D.005 Integration of incident command with operational core competence

Integration of Incident Command with Operational Core Competence

(a) Incident command

(1) In the realm of aerodrome rescue and firefighting services, Incident Command is a critical framework. It ensures structured, systematic, and coordinated command, control, and communication during emergency responses. This methodology is pivotal in managing resources, decisions, and strategies during incidents, ranging from small-scale emergencies to large-scale accidents.

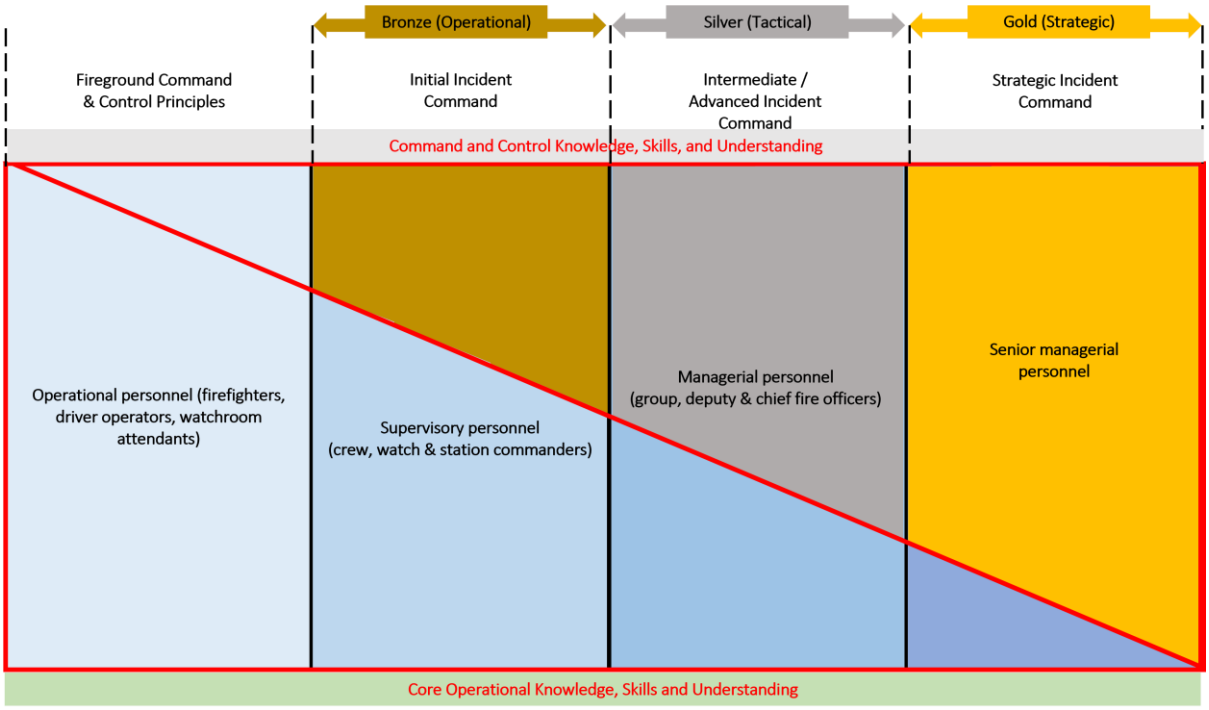
(b) Core Operational Competence

(1) Core operational competence in aerodrome rescue and firefighting services encompasses the essential skills, knowledge, and abilities required for effective emergency response. This includes expertise in fire suppression, rescue operations, hazard identification, risk assessment, and emergency medical care. These competencies are fundamental in ensuring that fire and rescue personnel can effectively mitigate risks and protect lives and property.

(c) Integration of Incident Command with Operational Competence

(1) The integration of Incident Command and Control with core operational competence is vital for efficient and effective aerodrome rescue and firefighting operations. This integration allows for a seamless transition from strategic planning to tactical execution. Incident Commanders utilize their understanding of operational competencies to make informed decisions and deploy resources strategically. Meanwhile, operational responders, equipped with robust operational skills, can adapt to the dynamic requirements of the incident, guided by the command structure. This synergy ensures a cohesive response, minimizing risks and enhancing the safety of both the public and the responders. Effective integration also fosters continuous improvement, as lessons learned from incidents feed back into training and development, further strengthening operational competencies. See Figure-1 below showing the integration of incident command with operational core competencies.

Figure-152: Integration of operational core competencies with incident command competencies.


Bronze (Operational)
Silver (Tactical)
Gold (Strategic)
Fireground Command & Control Principles
Initial Incident Command
Intermediate / Advanced Incident Command
Strategic Incident Command
Command and Control Knowledge, Skills, and Understanding
Operational personnel (firefighters, driver operators, watchroom attendants)
Supervisory personnel (crew, watch & station commanders)
Managerial personnel (group, deputy & chief fire officers)
Senior managerial personnel
Core Operational Knowledge, Skills and Understanding

SECTION E – VERTICAL FLIGHT INFRASTRUCTURE OPERATIONS PERSONNEL

TRG.OR.E.005 VERTICAL FLIGHT INFRASTRUCTURE OPERATIONS PERSONNEL — TRAINING

A vertical flight infrastructure operator shall establish and implement training and proficiency check programmes for its operational personnel including training in human performance and team coordination.

(a) ensure its personnel are trained and competent to perform their duties in safe and efficient manner;

(b) and

(c) ensure personnel assigned for rescue and firefighting duties participate in live fire drills commensurate with the types of aircraft, rescue and firefighting vehicles and equipment in use at the vertical flight infrastructure, including pressure-fed fuel fires.

AMC1 TRG.OR.E.005 VERTICAL FLIGHT INFRASTRUCTURE OPERATIONS PERSONNEL — TRAINING

Core training and proficiency check areas

1. Operations Post Holder (OPS)

(a) Training and proficiency checks programmes for operations post holder should include, as a minimum, the following areas:

(1) Understanding of GCAA regulations on vertical flight infrastructures (heliport, helideck or vertiport);

(2) Establishing and implementing safety management system including human factors;

(3) Emergency planning and rescue and firefighting provisions;

(4) Understanding quality assurance and compliance monitoring; and

(5) Understanding vertical flight infrastructure's maintenance programme

2. Landing Officer (LO) and Assistant (LA)

(a) Training and proficiency checks programmes for landing officer and assistant should include, as a minimum, the following areas:

(1) Understanding safe and efficient movement of aircraft during landing, takeoff, and ground operations;

(2) Understanding and operating visual and electronic aids used for aircraft guidance and landing.

(3) Demonstrate proficiency in radio communication with air traffic control (ATC), pilots, and ground crew.

(4) Identifying and addressing potential hazards, including FOD (foreign object debris) and equipment malfunctions.

(5) Understanding weather systems, interpreting meteorological data, and communicating conditions to pilots.

(6) Understanding emergency response procedures including coordinating with emergency services and operations teams during abnormal or emergency scenarios.

3. Rescue and Firefighting Team Leader (RTL) and Member (RTM)

(a) Training and proficiency checks programmes for RFF team leader and member should include, as a minimum, the following areas:

(1) Leading the firefighting team, assigning roles, and coordinating with other emergency services during incidents.

(2) Donning protective clothing and using respiratory equipment in different emergency scenarios.

(3) Demonstrate competency in various firefighting tactics and techniques specific to type of aircraft, battery systems, and fuel-related fires.

(4) Conducting rescue operations in various aircraft emergency scenarios including safe evacuation of casualties.

(5) Understanding different injuries and able to apply emergency first aid and CPR.

(6) Identifying and responding to hazardous materials, including aviation fuel and battery fire hazards.

5. Radio Operator (RO)

(a) Training and proficiency checks programmes for radio operator should include, as a minimum, the following areas:

(1) Understanding GCAA regulations on radio communication protocols, including phraseology and timing.

(2) Handling communications during emergencies, ensuring timely coordination between ground personnel and air traffic control.

(3) Operating and maintaining communication equipment to ensure reliability during operations.

(4) Ensuring continuous awareness of operational status and conveying critical information to relevant parties.

6. Audit Team Leader (ATL) and Member (ATM)

(a) Training and proficiency checks programmes for auditing team leader and member should include, as a minimum, the following areas:

(1) Understanding GCAA regulations on vertical flight infrastructures (heliport, helideck or vertiport).

(2) Understanding audit procedures and techniques required to inspect facilities, operations, and safety equipment.

(3) Conducting comprehensive safety audits, identifying non-compliances, and raising safety audit reports.

(4) Leading safety investigations including identifying root causes and recommending corrective actions.

GM1 AMC1 TRG.OR.E.005 STRUCTURED LEARNING PROGRAMME FOR OPERATIONS POST HOLDER

Structured learning programme for OPERATIONS post holder

Table-17 provides minimum training syllabus to training providers in delivering a structured learning programme for an operations post holder employed at a vertical flight infrastructure in the United Arab Emirates.

Table-96: Structured learning programme for an operations post holder

STRUCTURED LEARNING PROGRAMME FOR aN operations post holder
Aim and Objectives The aim and objectives of this training programme are to equip the delegate with the initial knowledge, understanding and skills required to perform the roles of an operations post holder at a vertical flight infrastructure safely and effectively.
Learning Outcomes (a) To successfully complete this training programme, delegates should be able to know and understand: (1) GCAA regulations on heliports, helidecks or vertiports (2) Planning considerations (3) Design considerations (4) Obstacle Control (5) Aerodrome rescue and firefighting (6) Emergency planning (7) Safety management system Acceptance process and requirements
Performance Assessment (a) Delegates will be assessed against the learning outcomes specified using written questions and direct observation as appropriate. (b) Debriefs should be conducted with participating delegates on the completion of practical exercises.
Duration and Timing (a) The duration for this training programme is a minimum of 40 hours excluding lunch and breaks, delivered over consecutive days. Where a blended learning method is provided, the total duration should not exceed 3 weeks.

(b) An approximate ratio of 70% theory to 30% practical is appropriate for this training programme.

(c) Practical and theory sessions should contain adequate breaks for delegate welfare.

(d) The total programme day includes the delegate enrolment and acceptance process, contact time, welfare breaks, meal breaks and where applicable, travel between sites.

Training Pre-requisites

(a) Delegates should have successfully completed the landing officer training programme.

Module 1 – Planning Considerations

(a) Status of ICAO, GCAA and other international regulations for heliport planning and design

(b) Legal binding principles

(c) ICAO standards and recommended practices on heliport requirements

(d) Types of heliports (surface-level heliports, elevated heliports, helidecks and shipboard heliports)

(e) Heliport data

(f) Acceptance of helicopters

(g) Helicopter flight characteristics, aerodynamics of rotor systems

(h) Relevant helicopter performance parameters (performance classes 1, 2 and 3) and classification of helicopters

(i) Geometric dimensioning of helicopters (overall length, rotor diameter, undercarriage width/length)

(j) Declared distances (TODAH, RTODAH, LDAH)

Module 2 – Design considerations

(a) Heliports, helidecks, vertiports and aerodromes

(b) Final approach and take-off area (FATO)

(c) Clearways

(d) Safety area

(e) Touchdown and lift-off area (TLOF)

(f) Ground taxiways and ground taxi-routes

(g) Air taxiways, air taxi-routes and air transit routes

(h) Aprons

(i) Visual Aids - markings and markers

Module 3 – Obstacle Control

(a) Regulations regarding obstacle limitation surfaces and sectors subject to type and usage of heliport

(b) Control of obstacles at heliports

Module 4 - Rescue and firefighting

(a) Levels of protection at on-shore heliports and off-shore helidecks

(b) Types and quantities of extinguishing agents (principal & complementary agents)

(c) Portable and fixed foam application systems

(d) Personnel requirements (task resource analysis)

(e) Consideration of response areas (on and off heliport area)

(f) Testing and inspection of aerodrome rescue and firefighting equipment

Module 5 - Emergency planning

(a) Developing an emergency plan

(b) Coordination with agencies

(c) Accident investigation

(d) Disabled helicopter removal plan

(e) Planning and conducting exercises/drills

Module 6 - Safety management system

(a) Safety policy and objectives

(b) Safety risk management

(c) Safety assurance including quality assurance

(d) Safety promotion

(e) Planning and conducting audits/inspections

GM2 AMC1 TRG.OR.E.005 STRUCTURED LEARNING PROGRAMME FOR LANDING OFFICER AND ASSISTANT

Structured learning programme for landing officer and assistant

Table-18 provides minimum training syllabus to training providers in delivering a structured learning programme for landing officer and assistant employed at a vertical flight infrastructure in the United Arab Emirates.

Table-97: Structured learning programme for landing officer and assistant.

Structured learning programme for landing officer and assistant
Aim/ Objectives
(a) The aim and objectives of this initial training programme are to equip the delegates with the initial knowledge, understanding and skills required to perform the roles and responsibilities as a Landing Officer or Assistant at a vertical flight infrastructure safely and effectively.

Learning Outcomes

(a) To successfully complete this training programme, delegates should be able to know and understand:

(1) Key parts of relevant operations regulations and guidelines

(2) Physical characteristics

(3) Obstacle-free requirements

(4) Operational equipment and systems

(5) Meteorological requirements for vertical flight infrastructure operations

(6) Typical hazards associated with vertical flight infrastructure operations.

(7) The role and key responsibilities of the VLO and VLA

(8) Main vertical flight infrastructure team responsibilities and required actions, including:

(i) 30 minutes before helicopter ETA;

(ii) 10 minutes before helicopter ETA;

(iii) Immediately before helicopter lands;

(iv) After landing: rotors running turnaround;

(v) After landing - engines shut down and rotors not running;

(vi) Helicopter/VCA tie-down, engine blanks and covers fitted; and

(vii) Helicopter/VCA start-up

(9) For offshore helideck, the structure and terms in a typical pre-flight weather report and floating installation (or vessel) data required by helicopter pilot.

(10) For offshore helideck, typical team requirements for Normally Unattended Installations (NPAIs).

(11) Correct use of handheld radios and radio checks, complying with radio communications protocol and correct use of appropriate hand signals if radio communications are ineffective.

(b) To successfully complete this training programme, delegates should be able to demonstrate:

(1) Checking landing area for contamination, debris or damage before and after take-off.

(2) Performing communication checks, checking equipment status, safety nets, security and stowage of equipment.

(3) Performing team brief prior to helicopter/VCA landing at appropriate times during helicopter/VCA operations.

(4) Wearing of appropriate PPE during helicopter/VCA operations

(5) Ensuring VFI team are in required locations during helicopter operations.

(6) Using handheld radios and radio checks

(7) Conducting and responding to required vertical flight infrastructure protocols during helicopter/VCA operations, to include: safe-to-approach, helicopter/VCA anti-collision lights switched off and 'thumbs-up' from pilot (as agreed by operating company).

(8) Checking passenger and freight manifests.

(9) As a landing officer, supervising landing assistants during passenger, freight and baggage handling:

(i) Loading, unloading and securing of life saving equipment;

(ii) Load and unload passenger baggage correctly;

(iii) Load and unload freight correctly – using correct manual handling techniques and within freight loading limitations and requirements;

(iv) Identify dangerous goods during helicopter/VCA loading and unloading; and

(v) Assist with passenger safe egress and access on the vertical flight infrastructure, to and from the helicopter/VCA.

(10) Complying with vertical flight infrastructure protocols and procedures during helicopter/VCA operations

(11) Complying with helicopter/VCA danger areas rules.

Performance Assessment

(a) Delegates should achieve a minimum of 80% attendance to be eligible for performance assessment.

(b) Delegates should attain a minimum of 80% score to be awarded with a certificate of competence.

(c) Delegates will be assessed against the learning outcomes specified in learning outcomes using direct observation and oral and/or written questions as appropriate.

(d) Debriefs should be conducted with participating delegates on the completion of practical exercises.

Duration and Timing

(a) The duration for this programme is a minimum of 40 hours excluding lunch and breaks. This programme should be delivered over consecutive days or where blended learning method is provided; the entire programme should not exceed 3 weeks.

(b) An approximate ratio of 60% theory to 40% practical is appropriate for this training programme.

(c) Practical and theory sessions should contain adequate breaks for delegate welfare.

(d) The total programme day includes the delegate enrolment and acceptance process, contact time, welfare breaks, meal breaks and where applicable, travel between sites.

MODULE 1 - Regulations and Guidelines

(a) Overview of UAE regulations and guidelines

(1) GCAA aviation regulations and safety management system

(2) GCAA dangerous goods regulations

(3) Emergency response requirements

(4) Operating procedures

(5) Acceptance criteria

MODULE 2 - Hazards and Management Systems

(a) Landing areas

(1) Physical characteristics, to include: 'D value', MTOW, access and escape routes, friction properties across the landing area

(2) Visual aids, marking and lights, to include: landing lights are fully serviceable and emergency power back-up is operational, installation obstacle lighting

(3) Obstacle-protected surfaces, to include:

(i) 210-degree Obstacle-Free Sector

(ii) 150-degree Limited Obstacle Sector

(iii) Clear Zone below Helideck Level - 5:1 falling gradient

(iv) Maximum height limit across the entire helideck

(4) Landing area and perimeter safety nets – purpose and requirements

(5) Landing areas and winching areas on vessels.

(b) Equipment and systems

(1) Main helicopter/VCA types used in region of operations including:

(i) Emergency exits

(ii) Seat configurations

(iii) Types of doors and hold openings

(2) Systems, to include:

(i) Visual aids (markings and lighting systems)

(ii) Wave-off and status lights.

(iii) TD/PM lighting

(3) Location and motion characteristics (floating installations)

(4) Acceptance limitations:

(5) Standard plant and equipment and uses; to include:

(i) Plant and equipment for routine and non-emergency response operations

(ii) Aerodrome rescue and firefighting equipment – guidance on when and where to use various media

(iii) Principal media requirements: foam type, delivery and testing

(iv) Complementary media requirements

(v) Portable and/or fixed foam application system: overview-only required.

(vi) Tie-down points. Prohibited landing marker

(6) Meteorological systems and minimum meteorological equipment requirement for region of operations.

(7) Typical systems routine checks.

(8) Reporting systems defects to appropriate person e.g., Accountable manager, Operations Manager, OIM, Helicopter Operator, etc

(c) Hazards

(1) Human factors that may affect the safety of helicopter/VCA operations, to include the following categories: the job/task, the individual and the organisation.

(2) Helicopter/VCA danger areas.

(3) Rotors running – personnel contact with main or tail rotors while on deck.

(4) Adverse weather effect on helicopter operations, to include: excessive wind turbulence, wave height, trigger lightning

(5) Poor visibility effect on helideck operations.

(6) Process thermal affects e.g., turbine exhausts and normal or emergency process venting.

(7) Helicopter/VCA engine or cabin fire.

(8) Electrical hazards.

(9) Mobile installations stability hazards during landing and take-off.

(10) Dangerous goods transfer to/from helicopter/VCA by the (c) Vertical flight infrastructure team.

(11) Helicopter refuelling/VCA charging operations: spillages and faulty equipment.

(12) Loose items (baggage, freight, netting etc.) being sucked into rotor area or air intake.

(13) Flying debris e.g. disintegrating rotor hitting personnel following a crash.

(14) Crane operations: crane work to cease during helicopter/VCA operations.

(15) Obstacles on deck.

(16) Noise hazard – ear protection requirement.

(17) Helicopter/VCA shutdown and start-up hazards

(18) Unfamiliarity with helicopter/VCA type

(19) Wrong deck landing

(20) Downdraft forces from helicopter/VCA creates in and around the vertical flight infrastructure areas

(d) Helicopter refuelling or VCA charging equipment

Note: Due to the technical nature of managing and quality assurance of helicopter refuelling or VCA charging, Helicopter refuelling or VCA charging training and acceptance should be provided through specialist training. This element provides a simple overview of the equipment a delegate may find onboard for the purpose of helicopter refuelling or VCA charging.

(1) Typical hazards during helicopter refuelling/ VCA charging, including:

(i) Spillage and ignition

(ii) Vapours

(iii) Hoses

(iv) Fuel handling / VCA charging

(2) Typical helicopter refuelling / VCA charging equipment, including:

(i) Tanks

(ii) Dispensing Unit

(iii) Hose

(iv) Delivery nozzle types

(v) Bonding

(3) Key roles and responsibilities relating to maintenance and quality checks, including:

(i) Quality Checks and record keeping – (Person who has been trained, accepted and competent in the task of helicopter refuelling offshore).

(ii) Maintenance (Appropriately trained and competent maintenance technicians)

MODULE 3 - Responsibilities during Landing and Departure

(a) The roles and key responsibilities of landing officer and assistant

(1) The role, key responsibilities and accountabilities of a landing officer during routine helicopter/VCA operations

(2) The role, key responsibilities and accountabilities of landing assistant during routine helicopter/VCA operations.

(b) Checks, procedures and communications during helicopter/VCA operations

(1) How the landing officer is identifiable to the helicopter crew.

(2) Typical helicopter/VCA operational procedures prior to landing, helicopter-on-deck and take off, to include:

(i) 30 minutes before helicopter/VCA ETA

(ii) 10 minutes before helicopter/VCA ETA

(iii) Immediately before landing

(iv) After landing - rotors running turnaround

(v) After landing - engines shut down and rotors not running

(vi) Helicopter/VCA tie-down, engine blanks and covers fitted - under the direction of the helicopter/VCA crew.

(vii) Helicopter/VCA start-up.

(3) Pre-flight weather report templates (typical) and standard weather report terms.

(4) Adverse weather helicopter/VCA operation limits.

(5) Floating installations and vessels data request by pilot, to include: inclination, heave-rate and heading.

Delegates to practice the role of landing officer:

(6) Ensuring duties and responsibilities are clearly understood during landing and departure.

(7) Briefing the assistants prior to operations, to include a ‘tool-box-talk’.

(8) Ensuring the assistants are in the correct location and stations during helicopter/VCA landing, take-off and preparing for helicopter/VCA emergencies.

(9) Ensuring assistants are equipped with appropriate PPE.

(10) Safety protocols e.g. safe-to-approach, helicopter/VCA anti-collision lights switched off and ‘thumbs-up’ from pilot (as agreed by operator).

(11) Effective communications, to include:

(i) Communications with all relevant personnel e.g. admin personnel, pilot, crane operator, standby vessel, fire crews, HLA/VLAs/VLAs, loaders and passengers (simulated)

(ii) Landing officer and flight crew radio transmissions restricted to essential dialogue.

(iii) Using standard radio comms protocols, to include landing assistants' radios set to 'receive-only' (landing assistants' should only transmit in the event of an emergency)

(iv) How to ensure that the correct and agreed protocol for "clear to lift" signal to the pilot is understood on the specific fixed or mobile installation the landing officer is operating on.

(v) Landing officer-to-pilot comms protocols are conducted correctly, to include 'deck available' or 'do not land' call to pilot.

(vi) Handover procedure to installation radio Aerodrome operators

(vii) Limitation of radio comms and correct use of hand signals

(12) Helicopter/VCA type identification.

(13) Monitoring of environmental conditions and change in conditions

(14) Radio communications system checks, to include two-way radio checks between landing officer and radio operator and/or admin.

(15) Checking VFI equipment availability.

(16) Landing officer to ensure that the VFI surface is free from any contamination, debris or damage after take-off.

Delegates to practice the role of landing assistant:

(17) Identifying and reporting hazards that the landing officer may not be aware of.

(18) Effective communications, to include:

(i) Confirming completion of tasks to the landing officer

(ii) Using standard radio protocols

(iii) Limitation of radio comms and correct use of hand signals - landing assistants' radios set to 'receive-only' during helicopter/VCA operations (landing assistants) should only transmit in the event of an emergency)

(iv) Radio communication protocols during helicopter/VCA operations.

(19) Helicopter/VCA type identification prior to landing – for helicopter/VCA-specific passenger, cargo loading and emergency response requirements.

(20) Assisting with monitoring of weather and environmental conditions.

(21) Assisting landing officer with communications system checks.

(22) Assisting landing officer with checking helideck equipment status and safety nets.

(23) Assisting landing officer with security and stowage of equipment - helicopter and heli-deck.

(24) Landing assistants are in a safe location adjacent to the helideck during helicopter landing, take-off and preparing for helicopter emergencies.

(25) Ensuring appropriate landing assistants' PPE are worn during helicopter operations.

MODULE 4 - Cargo and Passenger Handling

(a) Cargo Handling

(1) Helicopter/VCA freight loading limitations and requirements and how these will vary for different types of helicopters/VCAs.

(2) Underslung loads: hazards and typical procedures including risk assessment requirements.

(3) Importance of understanding and complying with company VFI operations procedures.

(4) VFI protocols including 'safe to approach the helicopter/VCA', anti-collision lights switched off and 'thumbs-up' from pilot.

Delegates to practice the role of a landing officer:

(5) Checking freight manifests (inbound and outbound)

(6) Preparing for, and supervising, correct loading and unloading of freight and baggage. (Landing officers should not become involved in manual activity, such as carrying bags, at the expense of their supervisory role).

(7) Supervising correct manual handling techniques during freight loading and unloading.

(8) Supervising passenger baggage reclamation from VFI or designated area

(9) Dangerous goods identification.

(10) Dangerous goods management; preparing for, and correct handling of dangerous goods according to GCAA regulations.

(11) 'Notification to Captain' of dangerous goods - NOTOC

Delegates to practice the role of a landing assistant:

(12) Responding to 'safe to approach the helicopter/VCA' from the landing officer.

(13) Complying with helicopter/VCA danger areas rules

(14) Assisting with preparations for, and correct handling of, freight and baggage.

(15) Correct manual handling techniques during freight loading and unloading.

(16) Asking for assistance from other landing assistants with heavy cargo.

(17) Dangerous goods identification.

(b) Passenger Handling

Delegates to practice the role of a landing officer:

(1) Checking and interpreting information on passenger manifest and routing plans

(2) Receiving incoming manifest from pilot and handing over outgoing manifest to pilot.

(3) Supervising passenger safe access and egress on vertical flight infrastructure.

(4) Supervising passenger entry into helicopter/VCA.

(5) Supervising passenger exit from helicopter/VCA.

(6) Conducting passenger checks, to include: checking that passengers are wearing required transit suits and lifejackets for region of operations, ear protection and seat belt harnesses are secure.

Delegates to practice the role of a landing assistant:

(7) Interpreting information on passenger manifests.

(8) Assisting with passenger safe egress and access on vertical flight infrastructure

(9) Assisting with passenger entry into helicopter/VCA.

(10) Assisting with passenger exit from helicopter/VCA.

(11) Being alert to changing events and conditions while assisting passengers.

MODULE 5 – Not Permanently Attended Installations

(a) Landing officer and assistant responsibilities on an NPAI

This element is about briefly explaining to the delegates how landing officer and assistant responsibilities on an NPAI differ from those on the main installation or vessel.

(1) Types of NPAIs

(2) Typical NPAI-specific hazards, to include guano infestation

(3) Landing officer first to disembark from helicopter/VCA.

(4) Disembarkation: NPAI status check by landing officer and decision to disembark helicopter/VCA passengers.

(5) Embarkation: landing officer is responsible for ensuring that all passengers have boarded the helicopter/VCA prior to take-off and landing assistant to assist landing officer in ensuring that all passengers have boarded the helicopter/VCA prior to take-off.

(6) Landing assistant to assist landing officer with the following, (where applicable):

(i) Bird exclusion devices are switched on

(ii) All equipment (fire extinguishers, firefighting clothing, chocks etc.) positioned on the vertical flight infrastructure and surrounding areas is correctly stored and secured.

(7) The importance of understanding and following individual company procedures for individual NPAIs.

GM3 AMC1 TRG.OR.E.005 STRUCTURED LEARNING PROGRAMME FOR RESCUE AND FIREFIGHTING TEAM LEADER AND MEMBER

Structured learning programme for rescue and firefighting team leader and member

Table-19 provides minimum training syllabus to training providers in delivering a structured learning programme for rescue and firefighting team leader and member employed at a vertical flight infrastructure in the United Arab Emirates.

Table-98: Structured learning programme for rescue and firefighting team leader and member

Structured learning programme for rescue and firefighting TEAM LEADER AND MEMBER
Aim and Objectives (a) The aim of this training programme is to equip personnel assigned to perform rescue and firefighting duties at a vertical flight infrastructure with the knowledge, understanding and skills required to perform as a team leader and member. (b) The main objectives are for delegates to fully understand the role and responsibilities of rescue and firefighting team leader (RTL) and member (RTM) and practice responding to a variety of helicopter/VCA firefighting and non-firefighting emergency scenarios in a training environment.
Learning Outcomes Delegates should be able to know and understand: (a) Module 1 (1) The key role and key responsibilities of the RTL and RTM. (2) The main elements of emergency response plan. (3) Types of potential helicopter/VCA emergencies. (4) Helicopter/VCA firefighting tactics and techniques. (5) The purpose of typical emergency systems and controls. (6) Casualty handling techniques – first aid and cardiopulmonary resuscitation (7) Personal protective clothing – benefits and limitations (8) Breathing apparatus – benefits and limitations (9) Rescue equipment – ladders, hoses, nozzles, forcible entry, (b) Module 2 (1) The main differences between vertical flight infrastructure emergency response on a main fixed or floating installation and a not permanently attended installation (NPAI). (c) Module 3

Delegates should be able to demonstrate:

(1) Emergency access and egress to and from vertical flight infrastructure including clear, concise and effective communications with RTL and RTM.

(2) RFFTM updating RFFTL on progress against the emergency response plan at appropriate times.

(3) Responding appropriately to direction during emergencies including the correct selection of appropriate fire-fighting equipment for the incident.

(4) Under direction from the RFFTL approaching the incident area in a controlled manner continually assessing how the changes in the emergency could impact on the safety of other RFF members, maintaining a means of escape from the incident area.

(5) Effective execution of emergency response tasks.

(6) Conducting helicopter incident firefighting operations, to include responding to a helicopter engine fire using a CO2 media extended applicator.

(7) Correct donning and use of breathing apparatus (BA)

(8) Perform search and rescue (SAR) principles and techniques – on or close to the vertical flight infrastructure, locating, extracting and handling missing personnel and casualties following a helicopter incident.

(9) Appropriate response to non-firefighting operations during helicopter/VCA incident.

(10) Effective use of firefighting fixed, portable and mobile systems, including fixed fire monitors, dry chemical and CO2 fire extinguishment and control media

(11) Responding to an NPAI vertical flight infrastructure fire (with limited firefighting equipment).

(12) Working with back-up RFF teams – where required to do so.

(13) Correct casualty handling and rescue techniques

(14) Hose-running techniques and associated hazards

Performance Assessment

(a) Delegates should be assessed medically fit by a qualified medical person due to high physical nature of this training programme.

(b) Delegates should achieve a minimum of 80% attendance to be eligible for performance assessment.

(c) Delegates should attain a minimum of 80% score to be awarded with a certificate of competence.

(d) Delegates will be assessed against the learning outcomes specified in learning outcomes using direct observation and oral and/or written questions as appropriate.

(e) Assessments results should be recorded and maintained.

Duration and Timing

(a) This duration of this programme is a minimum of 32 hours excluding lunch and breaks, delivered over consecutive days. Where a blended learning method is provided, the total duration should not exceed 3 weeks.

(b) An approximate ratio of 30% theory to 70% practical is appropriate for this training programme.

(c) Practical and theory sessions should contain adequate breaks for delegate welfare.

(d) The total programme day includes the delegate enrolment and acceptance process, contact time, welfare breaks, meal breaks and where applicable, travel between sites.

MODULE 1 Emergency Response Preparedness

(a) Emergency response pre-planning

(1) The role and key responsibilities of a RFFTL and RFFTM.

(2) The requirement for emergency response pre-planning.

(3) The main elements of a emergency response plan.

(4) Examples of emergency scenarios involving helicopter operations and typical response requirement of RFFTM to the emergency, to include:

(i) Helicopter/VCA incident resulting in crash/overturned aircraft involving fire/no fire

(ii) Engine fire

(iii) Fuel Spill during refuelling operations resulting in fire/no fire

(iv) Emergency/precautionary landing

(v) Responding to Class A fires caused by helicopter/VCA incident

(vi) Responding to Class B/E fires (flammable liquid spill, leaking fuel fires, electric fires, etc) caused by helicopter/VCA Incident

(vii) Rescue from an overturned aircraft

(viii) Internal fire fighting

(ix) Responding to a helicopter incident off the vertical flight infrastructure

(x) Loss of fire water main/pressure

(5) Events that may severely impact on flight safety, to include:

(i) Aviation fuel contamination

(ii) Obstructed vertical flight infrastructure

(iii) Wrong deck landing (wrong installation)

(iv) Installation, MODU or vessel status changes with helicopter/VCA on deck.

(6) General firefighting safety goals and objectives and how to achieve them.

(7) Helicopter/VCA emergency response practice: Fire and non-fire training drills and practices.

(b) Emergency systems and controls

(1) Typical firefighting equipment and systems, to include foam producing equipment performance requirements:

(i) Speed of response of producing foam

(ii) Reliability– through weekly tests and maintenance routines

(iii) Coverage

(iv) Quality of the foam

(v) Performance Standards

(2) Portable foam application system

(3) Fixed foam application system (DIFFS, FMS and RMS)

(4) Mobile firefighting equipment and systems

(5) Rescue equipment

(6) Helicopter/VCA emergency systems and controls that can be initiated by the RFFTMs under the direction of the RFFTL, to include helicopter/VCA:

(i) engine shutdown

(ii) fuel isolation

(iii) fixed firefighting and protection systems (onboard helicopters/VCAs)

MODULE 2 - Aerodrome rescue and firefighting Team Leader (RFFTL) and Member (RFFTM)

(a) Response in helicopter/VCA emergencies

(1) Human factors during emergency response including:

(i) stress affecting decision making

(ii) physical limitations

(iii) Sources of assistance available during emergency events

(2) Potential helicopter/VCA hazards during the emergency response, to include:

(i) fire

(ii) electrical

(iii) helicopter/VCA composition materials

(iv) dangerous goods cargo

(v) flotation devices

(3) PPE requirements

(4) How different helicopter/VCA types can affect the emergency response.

(5) Emergency response arrangements.

(6) Breathing apparatus operation and control procedures.

(7) Search and rescue (SAR) principles and techniques – on or close to the helideck, following helicopter/VCA incident on vertical flight infrastructure.

(8) Relevant equipment and controls - vertical flight infrastructure and helicopter/VCA

(9) Firefighting equipment: guidance on when and where to use various media.

(10) Monitoring of environmental conditions and how they may impact on the emergency response

(11) Awareness and understanding of back up crew during protracted incident.

(b) Practical Aerodrome rescue and firefighting Exercises

(1) Emergency access and egress to and from vertical flight infrastructure including clear, concise and effective communications with RFFTL and RFFTMs.

(2) RFFTM updating RFFTL on progress against the emergency response plan at appropriate times.

(3) RFFTM responding appropriately to RFFTL direction during emergencies including the correct selection of appropriate fire-fighting equipment for the incident.

(4) Under direction from the RFFTL: RFFTM approaching the incident area in a controlled manner – continually assessing how the changes in the emergency could impact on the safety of other RFFTMs, maintaining a means of escape from the incident area.

(5) Effective execution of emergency response tasks.

(6) Conducting helicopter/VCA incident firefighting operations, to include responding to a helicopter/VCA engine fire using a CO2 media extended applicator.

(7) Correct donning and use of breathing apparatus (BA) (all delegates to practice donning and using BA).

(8) Effective search and rescue (SAR) principles and techniques – on or close to the vertical flight infrastructure, locating, extracting and handling missing personnel and casualties following a helicopter incident on the vertical flight infrastructure.

(9) Appropriate response to non-firefighting operations during helicopter/VCA incident.

(10) Effective use of firefighting fixed, portable and mobile systems, including fixed fire monitors, dry chemical and CO2 fire extinguishment and control media

(11) Responding to an NPAI fire (with limited firefighting equipment).

(12) Working with back-up emergency response teams – where required to do so.

(13) Correct casualty handling techniques including first aid and cardiopulmonary resuscitation

(14) Hose-running techniques and associated hazards

(15) Using appropriate combinations of all of the following scenarios:

(i) Helicopter/VCA incident resulting in crash/overturned aircraft involving fire/no fire

(ii) Engine fire

(iii) Fuel Spill during refuelling operations resulting in fire/no fire

(iv) Emergency/precautionary landing

(v) Responding to Class A fires caused by helicopter incident

(vi) Responding to Class B/E fires (flammable liquid spill, leaking fuel fires, electrical fires) caused by helicopter/VCA Incident

(vii) Rescue from an overturned aircraft

(viii) Internal fire fighting

(ix) Responding to a helicopter/VCA incident off the facility

(x) Loss of fire water main/pressure

Note 1. - Classes B/E fires: For environmental purposes, smoke suppression or clean-burn systems are acceptable for reducing smoke during Class B fire exercises.

Note 2. - All delegates to practice in the role of the RFFTM during emergency response exercises.

Note 3. - Training Centres should provide a role-playing RFFTL during these exercises (this could be one of the instructors).

MODULE 3 - NPAI emergency Response

(a) NPAI emergency response requirements

(1) Planning for emergencies on an NPAI with limited emergency response capability, to include:

(i) Helicopter/VCA on deck, and

(ii) no helicopter/VCA on deck.

(2) NPAI Rescue, firefighting equipment and extinguishant media requirements.

(3) Typical limited NPAI accommodation – if personnel onboard NPAI have to stay beyond expected duration. (4) First aid arrangements on NPAI. (5) Evacuation from NPAI if no helicopter/VCA is available. (6) Importance of understanding and following individual company procedures relating to NPAI (7) Emergency response requirements

GM4 AMC1 TRG.OR.E.005 STRUCTURED LEARNING PROGRAMME FOR RADIO OPERATOR

Structured learning programme for radio operator

Table-20 provides minimum training syllabus to training providers in delivering a structured learning programme for a radio operator employed at a vertical flight infrastructure in the United Arab Emirates.

Table-99: Structured learning programme for radio operator

Structured learning programme for radio operator
Aim and Objectives (a) The aim and objectives of the Radio Operator (RO) training programme are to equip the delegate with the initial knowledge, understanding and skills required to perform the roles of Radio Operator at a vertical flight infrastructure safely and effectively.
Learning Outcomes (a) To successfully complete this training programme, delegates should be able to know and understand: (1) Aeronautical information services (2) Communications techniques, procedures and phraseology (3) Radiotelephony – general procedures (4) Aerodrome phraseology (5) Emergency phraseology (6) Miscellaneous phraseology
Performance Assessment (a) Delegates will be assessed against the learning outcomes specified using direct observation and oral and/or written questions as appropriate.

(b) Debriefs should be conducted with participating delegates on the completion of practical exercises.

Duration and Timing

(a) The duration for this training programme is a minimum of 24 hours excluding lunch and breaks, delivered over consecutive days. Where a blended learning method is provided, the total duration should not exceed 3 weeks.

(b) An approximate ratio of 60% theory to 40% practical is appropriate for this training programme.

(c) Practical and theory sessions should contain adequate breaks for delegate welfare.

(d) The total programme day includes the delegate enrolment and acceptance process, contact time, welfare breaks, meal breaks and where applicable, travel between sites.

Module 1. GCAA Aeronautical Information Services Regulations (Overview)

(a) Glossary of aeronautical terms

(b) Communications techniques, procedures and phraseology

(1) General communications procedures

(c) Aeronautical radio stations

(1) VHF radio propagation and radio interference

(2) Frequency assignments and designated operational coverage

(3) Categories of messages

Module 2. GCAA Radiotelephony Standards

(a) Glossary

(1) Terms: definitions and abbreviations

(b) Radiotelephony – general procedures

(1) Introduction

(2) Transmitting technique

(3) Transmission of letters

(4) Transmission of numbers

(5) Transmission of time

(6) Standard words and phrases

(7) Call signs for aeronautical stations

(8) Call signs for aircraft

(9) Continuation of communications

(10) Corrections and repetitions

(11) Acknowledgement of receipt

(12) Transfer of communications

(13) Clearance issue and read back requirements

(14) Withholding clearances

(15) Simultaneous transmissions

(16) Complying with clearances and instructions

(17) Communication failure

(18) Test transmissions

(19) Hours of service and communications watch

(20) Categories of message

(c) Aerodrome phraseology

(1) Offshore communication service

(2) Aerodrome information

(3) Meteorological conditions

(d) Emergency phraseology

(1) Distress and urgency communication procedures

(e) Miscellaneous phraseology

(1) Other communications

(2) Oil pollution reporting

(3) Aircraft operating agency messages

(f) Delegates are to demonstrate understanding of:

(1) Understanding GCAA procedures and regulations

(2) Communications technique

(3) Standard phraseology

(4) Distress and Urgency procedures (Mayday/Pan)

(5) Effect of aircraft height on range

(6) Typical abbreviations used in Radio communications

(7) Use of relevant aeronautical terms

(g) Delegates are to practice the role of RO:

A delegate assumes the role of a radio operator on a vertical flight infrastructure whilst the instructor will take the role of a helicopter/VCA pilot and other agencies. Delegates are to perform the following:

(1) Establish communications with approaching and departing helicopter/VCA to/from the heliport/helideck

(2)	Exchange readability reports
(3)	Give appropriate information to the helicopter/VCA prior to departing from your vertical flight infrastructure
(4)	Act correctly when helicopter/VCA with similar callsigns are 'on-frequency'
(5)	Respond to telephone calls from other stations
(6)	Use the phonetic alphabet
(7)	Use standard RTF (Radiotelephony) phraseology
(8)	Handle distress and/or urgency messages from a helicopter/VCA
(9)	Deal with unusual situation messages
(10)	Deal with requests to pass 'company' messages

GM5 AMC1 TRG.OR.E.005 STRUCTURED LEARNING PROGRAMME FOR AUDIT TEAM LEADER AND MEMBER

Structured learning programme for VFI audit team leader and member

Table-21 provides minimum training syllabus to training providers in delivering a structured learning programme for audit team leader and member employed at a vertical flight infrastructure in the United Arab Emirates.

Table-100: Structured learning programme for audit team leader and member

Structured learning programme for audit team leader and member
Aim and Objectives The aim and objectives of the training programme are to equip the delegate with the initial knowledge, understanding and skills required to perform the roles of audit team leader and member at a vertical flight infrastructure safely and effectively.
Learning Outcomes To successfully complete this training programme, delegates should be able to know and understand: (a) GCAA regulations on heliports, helidecks or vertiports (b) Operational Environment & Equipment (c) Inspector – roles and responsibilities (d) Components of inspection (e) Helicopter/VCA performances and operations (f) Acceptance process and requirements
Performance Assessment

(a) Delegates will be assessed against the learning outcomes specified using direct observation and oral and/or written questions as appropriate. (b) Debriefs should be conducted with participating delegates on the completion of practical exercises.
Duration and Timing (a) The duration for this training programme is a minimum of 40 hours excluding lunch and breaks, delivered over consecutive days. Where a blended learning method is provided, the total duration should not exceed 3 weeks. (b) An approximate ratio of 60% theory to 40% practical is appropriate for this training programme. (c) Practical and theory sessions should contain adequate breaks for delegate welfare. (d) The total programme day includes the delegate enrolment and acceptance process, contact time, welfare breaks, meal breaks and where applicable, travel between sites.
Training Pre-requisites Delegates should have successfully completed the following trainings: (a) a landing officer; (b) rescue and firefighting; and (c) radio operator.
Module 1 – GCAA Regulations (a) International / Local Requirements (b) Operation Manual (c) Heli-deck Limitation List (HLL) (d) Personnel requirements (e) Types of heliports, helidecks and vertiports (f) Physical characteristics (Marking, Visual Aids, Lighting, Friction, Access Point and All Facilities) **Module 2 – Operational Environment & Equipment** (a) Danger Zone (b) Heli-deck & Aviation Hazard (c) Obstacle limitation surfaces / Airspace (d) FATO & TLOF (e) Safety Area (f) Weather Observation (g) Rescue Equipment (h) Firefighting Equipment

(i) Communication Equipment

(j) Meteorological Equipment

Module 3 – Roles and responsibilities of an Inspector

(a) Requirement

(b) Roles and responsibilities

(c) Certificates

(d) Equipment

(e) Training

Module 4 - Components of Inspection

(a) Planning inspection

(b) Preparing inspection

(c) Conducting inspection

(d) Writing a report

(e) Following up on inspection

Module 5 – Helicopter/VCA Performances & Operations

(a) Engine Performances

(b) Take-Off

(c) Start-Up

(d) Landing & Departure Preparation

(e) Emergency System & Control

Module 6 - Acceptance process and requirements

(a) Introduction

(b) Risk Assessment and Heli-deck Limitation List

(c) Inspection report

(d) Application and acceptance process

(e) Post acceptance and surveillance obligations/requirements

AMC2 TRG.OR.E.005 VERTICAL FLIGHT INFRASTRUCTURE OPERATIONS PERSONNEL — TRAINING

Frequency of training and proficiency checks

(a) Initial training should be completed by all newly appointed personnel to develop the minimum skills and knowledge required for their roles before assuming their duties, ensuring they are competent and fully prepared to perform their tasks safely and efficiently. Where current personnel have been absent from their duties for a prolonged period or where major competency deficiencies are discovered following an incident, they should attend initial training.

(b) Refresher training should be conducted not exceeding four years to ensure personnel stay up-to-date with regulatory changes, technological advancements, and operational best practices. Additional refresher training may be required when there are significant changes to operational procedures, equipment, or regulations.

(c) Proficiency checks should be conducted annually for all operational personnel to validate their ongoing competency in both routine and emergency tasks. Additional proficiency checks should be carried out whenever personnel are transferred to new roles or responsibilities, after extended periods of leave, or following the introduction of new equipment or procedures. Proficiency checks should evaluate both theoretical knowledge and practical skills. The assessment should include:

(1) Normal operations: Ensuring personnel can perform their day-to-day tasks efficiently and safely.

(2) Emergency scenarios: Testing responses to simulated incidents, such as aircraft fires, emergency landings, or hazardous material spills.

(3) Communication and coordination: Evaluating the ability to communicate clearly and effectively with other team members, operations management, and external agencies.

(4) Each proficiency check should be conducted by a qualified assessor using a standardised checklist, ensuring consistency and fairness in evaluations. All personnel should achieve a satisfactory performance rating to continue in their operational roles.

AMC3 TRG.OR.E.005 VERTICAL FLIGHT INFRASTRUCTURE OPERATIONS PERSONNEL — TRAINING

Competency-based training and assessment (CBTA) programme

(a) Competence-based training and assessment programmes should be designed to ensure that all personnel including associated facilities and equipment are at all times fully efficient. In addition, the programmes should also be designed to build cohesiveness in order to deliver a consistent level of proficiency.

(b) To ensure a high standard of operational readiness, an operator should develop a competency audit framework to assess the effectiveness of the programmes at both individual and team levels

GM1 AMC3 TRG.OR.D.005 ESTABLISHING AND IMPLEMENTING COMPETENCE STANDARDS

Guidance on establishing and implementing competence standards for ARFFS personnel can refer to GM1 AMC4 TRG.OR.D.005 Establishing and implementing competence standards.

SECTION F – TRAINING PROVIDERS

TRG.OR.F.005 Training provider

(a) No entity shall provide trainings to aerodrome rescue and firefighting and vertical flight infrastructure operations personnel without an acceptance from the GCAA.

(b) Where an entity including its associated facilities is located outside the United Arab Emirates, the entity shall bear all costs for the initial regulatory acceptance and continued oversight activities, in accordance with GCAA policies and procedures.

(c) The entity shall comply with the application training and proficiency checks requirements, in accordance with TRG.OR.B.005 Training and proficiency check programmes.

GM1 TRG.OR.F.005 Training provider

Training provider – general

(a) A training provider mentioned in this Section can either be:

(1) a holder of GCAA aerodrome certificate or landing area acceptance;

(2) a holder of GCAA vertical flight infrastructure (heliport, helideck or vertiport) certificate or landing area acceptance; or

(3) a person or organisation with a trade license located within or outside the United Arab Emirates.

AMC1 TRG.OR.F.005 Training provider — acceptance requirements

Training provider — ACCEPTANCE REQUIREMENTS

(a) For an initial acceptance, the applicant should submit a formal application to the GCAA via our website (https://www.gcaa.gov.ae/en/) including the following information:

(1) the registered name and address of the training provider;

(2) the address of the training provider requiring the initial acceptance;

(3) the intended scope of acceptance;

(4) the name and signature of the accountable manager; and

(5) the date of application.

(b) Upon issuance of a training provider certificate, the acceptance should remain valid, subject to the following conditions:

(1) the training provider continued compliance with this regulation, in accordance with the provisions related to the handling of findings as specified in this regulation;

(2) the GCAA is granted full access to the training provider and its personnel, facilities, equipment, etc, including contracted activities, to determine continued compliance with the requirements; and

(3) the certificate is not being surrendered or revoked.

(c) Where the training provider decides to surrender or revoke its acceptance, the certificate should be immediately returned to the GCAA.

GM1 AMC1 TRG.OR.F.005 Training provider — acceptance requirements

Training provider — ACCEPTANCE REQUIREMENTS

(a) The acceptance processes consist of the following phases (see Figure-2):

(1) Phase 1 (Initial) – Upon receiving the application, the GCAA will meet with the training provider to understand its intention and overall requirements

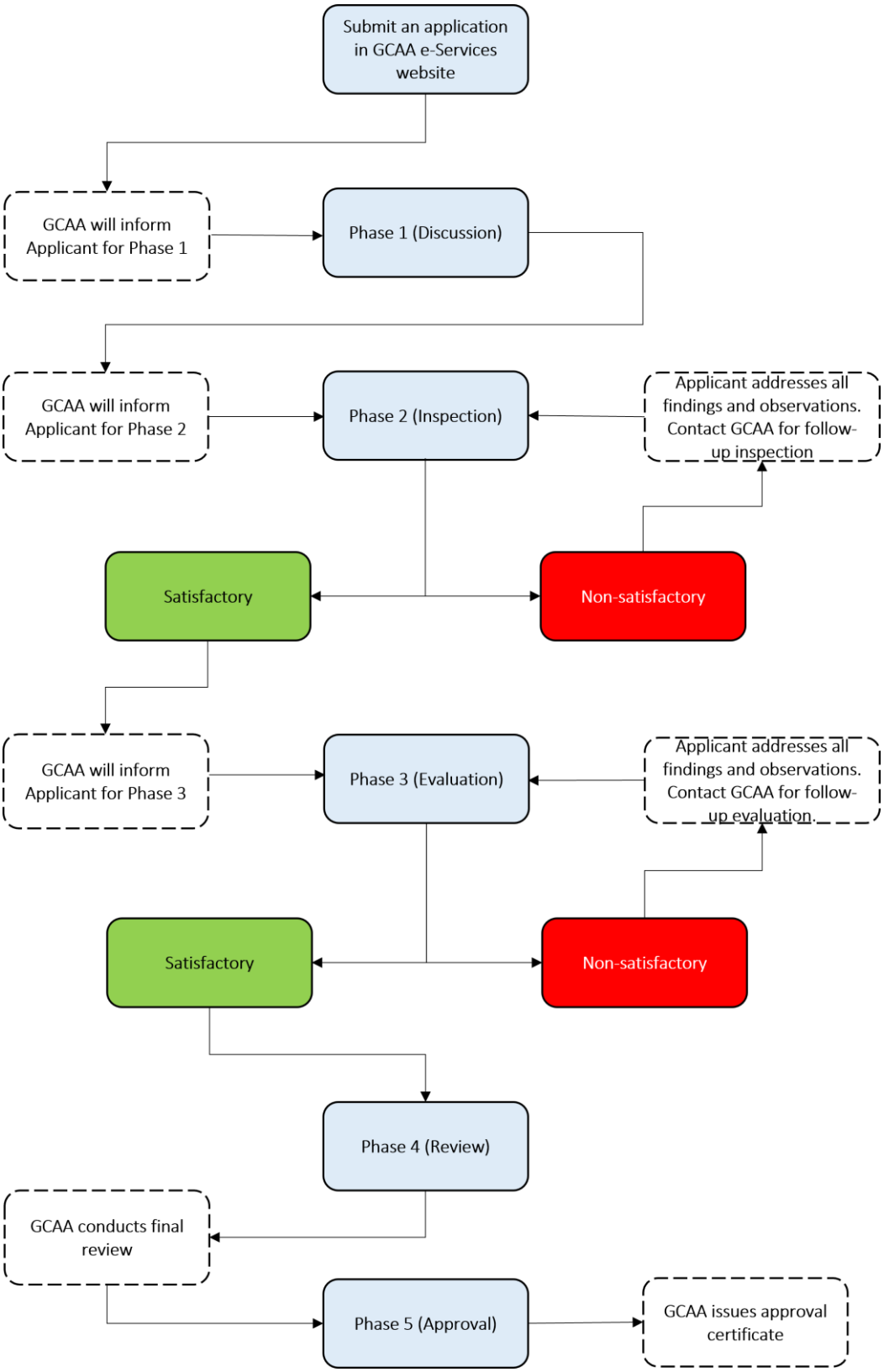
(2) Phase 2 (Inspection) – The GCAA will conduct site inspections of personnel, training documents, facilities, resources and equipment.

(3) Phase 3 (Evaluation) – The GCAA will conduct evaluations of the design, delivery, and control of training and assessments programmes, including attending theoretical and practical lessons.

(4) Phase 4 (Final review) – The GCAA will conduct a full review of the submission.

(5) Phase 5 (Acceptance) – Upon satisfactory completion of all phases, the GCAA will process the acceptance.

Figure-153: Training provider acceptance process flow


Submit an application in GCAA e-Services website
GCAA will inform Applicant for Phase 1
Phase 1 (Discussion)
GCAA will inform Applicant for Phase 2
Phase 2 (Inspection)
Applicant addresses all findings and observations. Contact GCAA for follow-up inspection
Satisfactory
Non-satisfactory
GCAA will inform Applicant for Phase 3
Phase 3 (Evaluation)
Applicant addresses all findings and observations. Contact GCAA for follow-up evaluation.
Satisfactory
Non-satisfactory
Phase 4 (Review)
GCAA conducts final review
Phase 5 (Approval)
GCAA issues approval certificate

(b) The training provider will be formally notified after each phase. Completion of each phase is dependent on compliance with the training requirements. The GCAA may conduct more site inspections, if necessary.

(c) Upon successful completion of all phases, a training provider certificate will be issued to the training provider.

(d) The training provider is given up to 3 months or as determined by the GCAA, to address the findings and/or observations raised by the GCAA during the acceptance process. If no satisfactory response is received thereafter, the GCAA will cancel the application. The training provider may request for an extension subject to the acceptance of the GCAA. If the training provider decides to withdraw the application, the GCAA should be formally notified.

AMC2 TRG.OR.F.005 Training provider — other training accredited body or organisation

Acceptance from other training accredited body or organisation

(a) Where the training provider have attained prior acceptance from another international accredited training body or organisation, the requirements mentioned in AMC1 TRG.OR.F.005 Acceptance requirements may be reduced or omitted.

(b) The training provider should submit an assessment to the GCAA to demonstrate compliance against the applicable requirements stated in this Regulation. The GCAA will review the assessment and notify the training provider accordingly.

AMC3 TRG.OR.F.005 Training provider — personnel requirements

Training provider — personnel requirements

(a) The training provider should ensure:

(1) an accountable manager is appointed who is responsible in ensuring that the organisation has adequate resources, staffing, facilities and financed to comply with this regulation.

(2) a training post holder is appointed who will be responsible for managing the overall delivery of the training programs in accordance with these requirements.

(3) sufficient resources and staffing to plan/perform knowledge and practical training, conduct examinations and assessments in accordance with these requirements, which include but not limited to instructor and assessor.

(4) the experience and qualifications of instructors and assessors are appropriate to the training provided and established in accordance with these requirements, and/or with competence standards agreed by the GCAA.

(5) instructors and assessors are specified in the organisation manual for the acceptance of such staff.

(6) instructors and assessors maintain their competencies, at least, every 2 years relevant to current technology, practical skills, human factors and the latest training techniques appropriate to the knowledge being trained or examined.

(7) due to the size and complexity of the organisation, additional staff such course developers, maintenance team, administrative, safety, quality, etc, are available.

(b) The training provider should ensure:

(1) records of all instructors and assessors are maintained;

(2) records reflect the experience and qualification, training history and any subsequent trainings undertaken;

(3) terms of reference should be drawn up for all instructors and assessors;

(4) the following minimum information relevant to the scope of activity are kept on record in respect of each instructor and assessor:

(i) Name

(ii) Date of Birth

(iii) Personnel Number

(iv) Experience

(v) Qualifications

(vi) Training history (before entry)

(vii) Subsequent Training

(viii) Scope of activity

(ix) Starting date of employment/contract

(x) If appropriate – ending date of employment/contract.

(5) records are kept in any format but should be under the control of the organisation's quality management system; and

(6) records on any persons authorised to access the records are maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records become accessible to unauthorised persons.

AMC4 TRG.OR.F.005 Training provider — aerodrome rescue and firefighting facilities requirements

ARFF Training facilities

(a) Size and structure of training facilities should commensurate with the type of training provided to rescue and firefighting personnel. A single training structure or a combination of structures should be considered as long as the intended training objectives are achieved.

(b) An analysis should be conducted to determine the appropriate training facilities, resources and equipment required to deliver the training and proficiency checks programmes.

(c) Training facilities should be suitably designed and equipped to ensure effective delivery of training programmes, protection from the prevailing weather and safe operation of all planned training and assessment for rescue and firefighting personnel.

(d) Training provider should establish and implement a preventive maintenance programme for the training facilities including associated vehicles and equipment.

GM1 AMC4 TRG.OR.F.005 ARFF training facility design, construction, and operation

ARFF Training facility design, construction, and operation

(a) Live fire training facilities should make provision for ARFFS personnel to practice the tactics and techniques for the control and extinguishment of aviation fuel fires including pressure fed fires.

(b) Ideally live fire training should involve Class B liquid fires. However, taking into account the various requirements and sources of guidance, the use of Liquefied Petroleum Gas (LPG) may be considered as a suitable alternative to the use of Class B liquid fuels. This is based on the principles that:

(1) LPG can enhance safety during training due to its controllability

(2) Environmental constraints can restrict the use of Class B liquid for fire training at aerodromes

(3) Generating high volumes of black smoke may not be acceptable at an aerodrome

(c) It is important that, if LPG is used during live fire drills, ARFFS personnel are provided with suitable training to enable them to recognise the differing characteristics of LPG as opposed to class B fires when used to simulate realistic fire training.

(d) Provision should also be made for ARFFS personnel to periodically practice the application of the types of extinguishing agent available at the aerodrome onto a Class B liquid fire.

(e) The frequency of live fire drills, and the periodic application of firefighting agent to control and extinguish a Class B fire, should be determined through a suitable decay analysis.

(f) The aircraft simulator should make provision for ARFFS personnel to practice:

(1) Vehicle manoeuvring

(2) Command and control sectorisation

(3) Aircraft external fires – engines, undercarriage, fuselage, fuel tanks, wings, etc.

(4) Aircraft internal fires – flight deck, cabin, lavatory, pantry, cargo, etc.

(5) Gaining entry

(6) Search and rescue

(7) Specialist equipment drills e.g. HRET, aerial appliances, rescue/emergency stairs

(g) The ARFFS training simulator should be designed in accordance with the relevant standards and is subject to a suitable inspection and maintenance programme by a competent authority.

(e) System Description

(1) Types. There are two main types of ARFF training facilities that use two main types of fuel. ARFF training facilities can be either “fixed” or “mobile.” Fixed systems may use Flammable Liquid Hydrocarbons (FLHs) or LPG as the training fuel, while mobile systems use only LPG.

(2) Components. ARFF training facilities contain the following functional units (See Figure-3):

(i) Burn area

(ii) Vehicle manoeuvring area

(iii) Aircraft mock-up

(iv) Control station

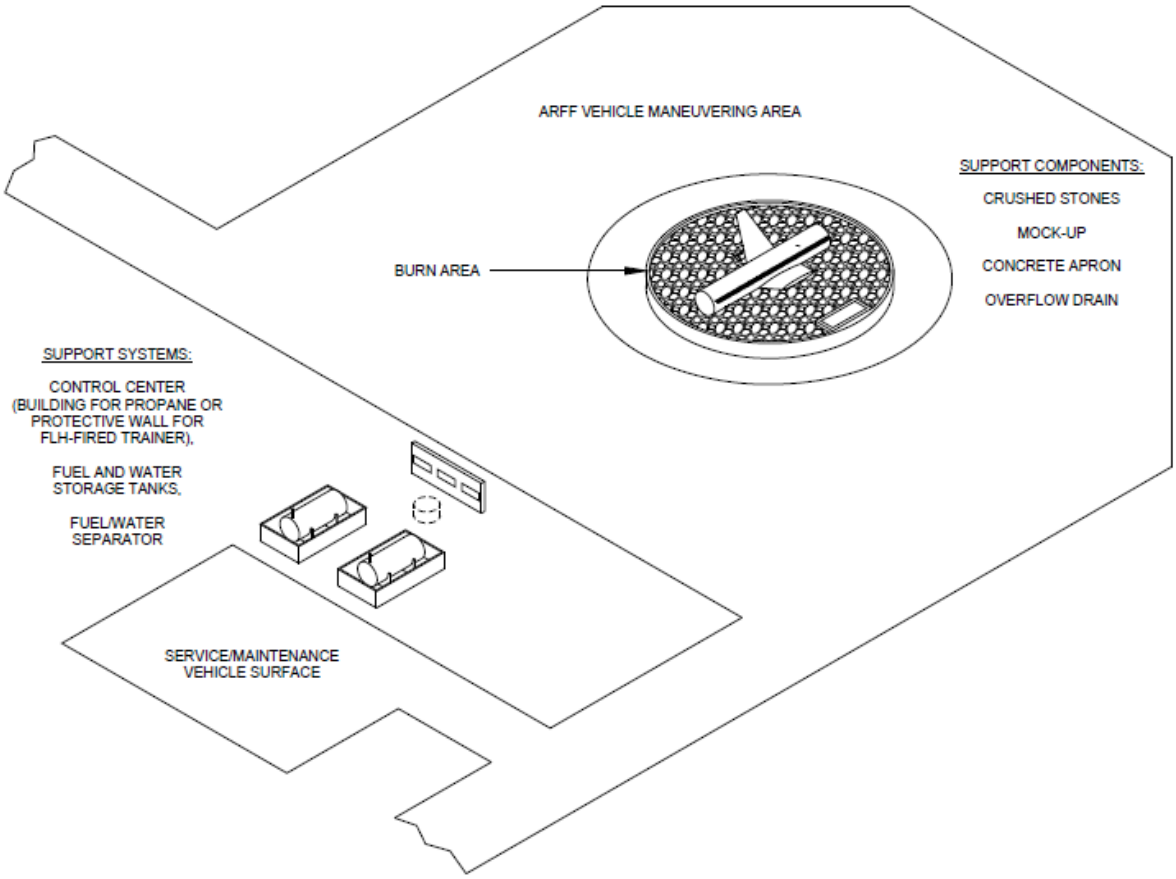
(v) Support systems:

(vi) Fuel delivery / collection

(vii) Water delivery / collection

(viii) Electrical

Figure-154: Basic components of aircraft aerodrome rescue and firefighting training facility



(f) System Components

(1) Burn Area Structure. The burn area structure, or fire area, is the focal point of the training facility. It is designed to create a realistic aircraft accident fire environment and to contain training substances. Its size is a function of the typical aircraft serving the airport.

(2) Vehicle Manoeuvring Area. This area physically surrounds the burn area structure and should be large enough to allow for the tactical operation of ARFF vehicles as they approach the burn area structure and the realistic deployment of personnel using hand lines.

(3) Aircraft Mock-up. A structure of a configuration and size that represents the typical aircraft servicing the airport. The mock-up is capable of presenting a variety of realistic exterior, component, and interior aircraft fires if specified. The mock-up may either be of a fixed or mobile type.

(4) Control Station. A system that allows an operator to configure and control the live-fire exercises of the training facility. The station may utilize either manual or automatic control systems to control the simulation variables.

(5) Support Systems. Support systems comprise the functional units needed for a training facility to function properly and implement the simulation of various types of aircraft fires. Each support system contains individual support components that make up the system (e.g., the fuel distribution system consists of a storage tank, pumps, associated piping, etc.). These systems include:

(i) Fuel delivery / collection.

(ii) Water delivery / collection.

(g) Training providers should consider the benefits of VR simulation in support of training and proficiency checks.

(h) Training providers should provide suitable hygiene and welfare facilities for both males and females (if required), which may include:

(1) Toilets and showers

(2) Changing areas

(3) Rest areas

(4) Smoking areas where appropriate

(5) First aid

(6) Dirty / clean areas for equipment servicing / exercise briefings

(i) Fully enclosed appropriate accommodation separate from other facilities should be provided for the instruction of theory and the conduct of knowledge examinations.

(1) The maximum number of students undergoing knowledge training during any training course should be defined.

(2) The size of accommodation for examination purposes should be such that no student can read the paperwork or computer screen of any other student from his/her position during examinations.

(3) The accommodation environment should be maintained such that students are able to concentrate on their studies or examination as appropriate, without undue distraction or discomfort.

(4) In the case of a practical training, facilities separate from training classrooms should be provided for practical instruction appropriate to the planned training course. If, however, the organisation is unable to provide such facilities, arrangements may be made with another organisation to provide such workshops and/or maintenance facilities, in which case a written agreement should be made with such organisation

specifying the conditions of access and use thereof. The GCAA requires full access to any such contracted organisation and the written agreement should specify this access.

(5) The maximum number of students undergoing practical training during any training course should be safely determined. Where a high-risk practical training is involved e.g., live fire evolution training, the maximum number should not exceed 7 students per instructor or assessor. If a trained assistant is provided, a maximum number of students should not exceed 3 per assistant.

(6) Office accommodation should be provided for instructors and assessors of a standard to ensure that they can prepare for their duties without undue distraction or discomfort.

(7) Secure storage facilities should be provided for assessment papers and training records. The storage environment should be such that documents remain in good condition for the retention period of a minimum of 5 years. The storage facilities and office accommodation may be combined, subject to adequate security.

(j) Preventive maintenance programme for the training facilities including associated vehicles and equipment should be in accordance with OEM recommendations and/or other internationally-accepted standards.

(k) Guidance on the design, construction, and operation of aircraft aerodrome rescue and firefighting (ARFF) training facilities can be refer to US Federal Aviation Administration Advisory Circular 150/5220-17B Aircraft Rescue and Fire Fighting (ARFF) Training Facilities.

AMC5 TRG.OR.E.005 Training provider — vertical flight infrastructure facilities requirements

vertical flight infrastructure training facilities and equipment

(a) Training provider should:

(1) ensure training facilities and equipment commensurate with the types of training and proficiency checks programmes;

(2) provide surface and elevated training structures of the common type of helicopter/VCA operating at onshore and offshore facilities; and

(3) establish and implement a preventive maintenance programme for training facilities including associated vehicles and equipment.

GM1 AMC5 TRG.OR.E.005 Vertical flight infrastructure training facilities and equipment

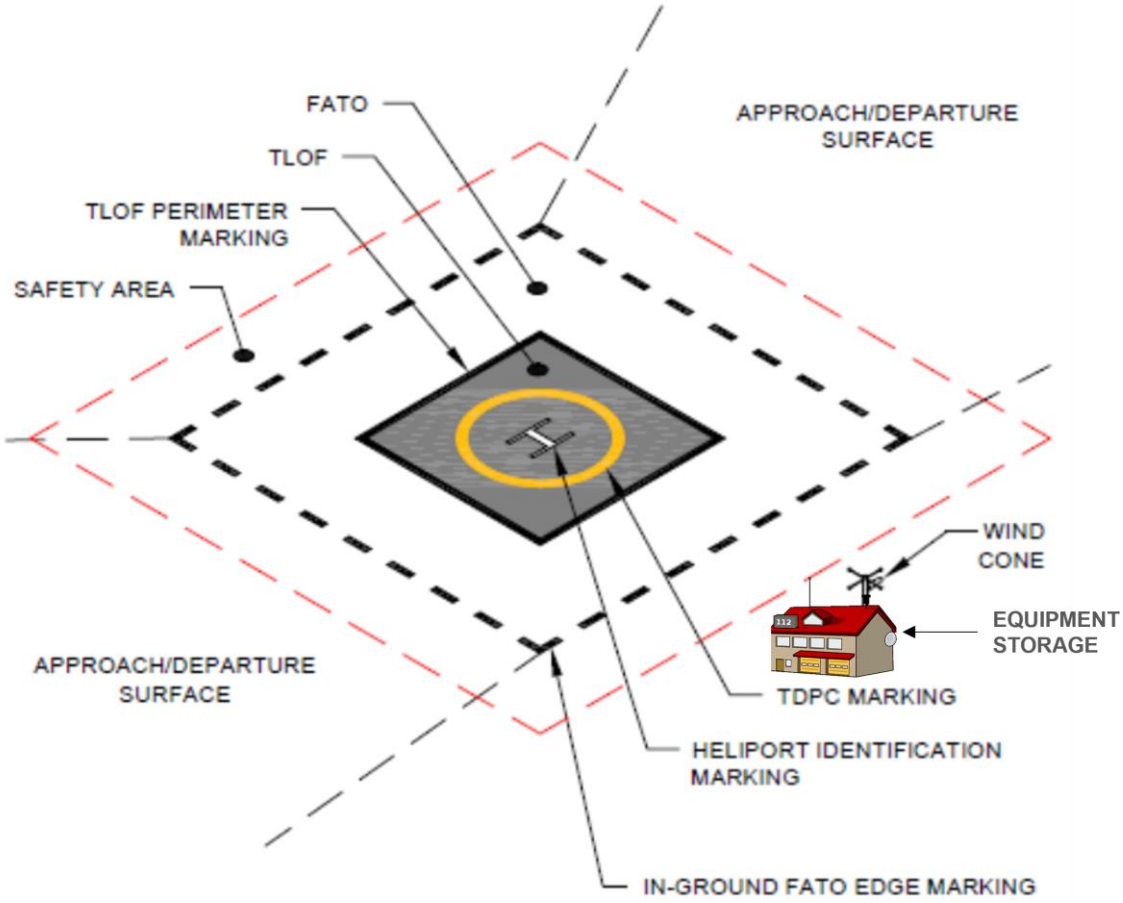
vertical flight infrastructure training facilities and equipment

(a) For surface-level training structure (see Figure-4):

(1) a diameter of FATO/TLOF based on a helicopter having D-value of not less than 12-m or a VCA having a D-value of not less than 8-m; and

(2) adequate safety area of not less than 15-m should be provided for the free movement of vehicle, personnel and equipment during trainings.

Figure-155: Example of a surface level training structure



(b) For an elevated training structure (see Figure-5):

(1) elevation from ground level should be no less than 2.5-m from ground level.

(2) have stair-access wide enough for RFF teams to manoeuvre aerodrome rescue and firefighting equipment to and from the landing area.

(3) Landing Area: Minimum helicopter D-value of 12-m or VCA D-value of 8-m.

(4) The structure should contain at least two helicopter/VCA wells and should:

(i) be of sufficient depth below the deck so that RFF personnel can take cover from flying debris in the event of a helicopter/VCA crash on deck;

(ii) have sufficient space to allow at least two people to move freely

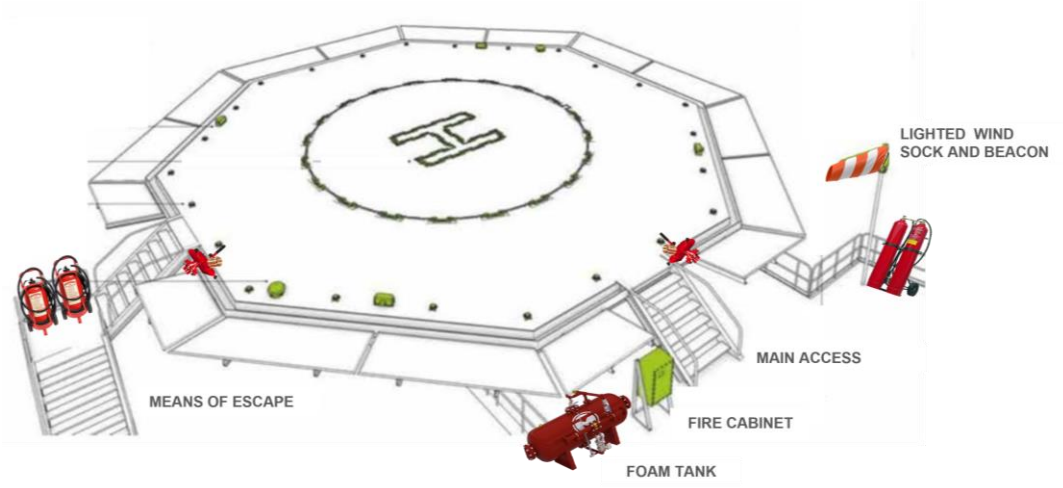
(iii) have a safety railing around the helicopter/VCA well

(iv) provide at least two fire monitors, preferably more, typical of the type used on elevated or offshore facility;

(v) be accessible by grated walkways and /or stairs; and

(vi) have stair (with handrails) access to the landing area.

Figure-156: Example of an elevated training structure



(c) Training facility should capable of replicating Class A, B and E fires expected of a helicopter/VCA accident.

(d) Wind sock.

(e) Portable and fixed foam application system equipment should be of adequate performance and be suitably located to ensure an effective application of foam to any part of the VFI landing area irrespective of the wind strength/direction or accident location.

1. Landing Area Markings

(a) Makings should be typical of marking used onshore and offshore VFIs (see Figure-6 for an example of helicopter landing area markings and Figure-7 for an example of VTOL-capable aircraft landing area markings).

Figure-157: Example of helicopter landing area markings

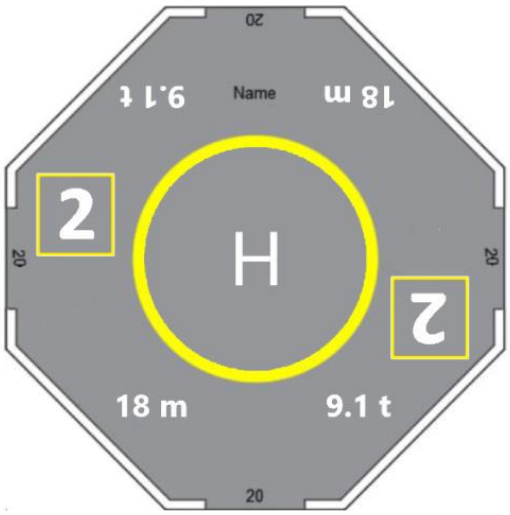
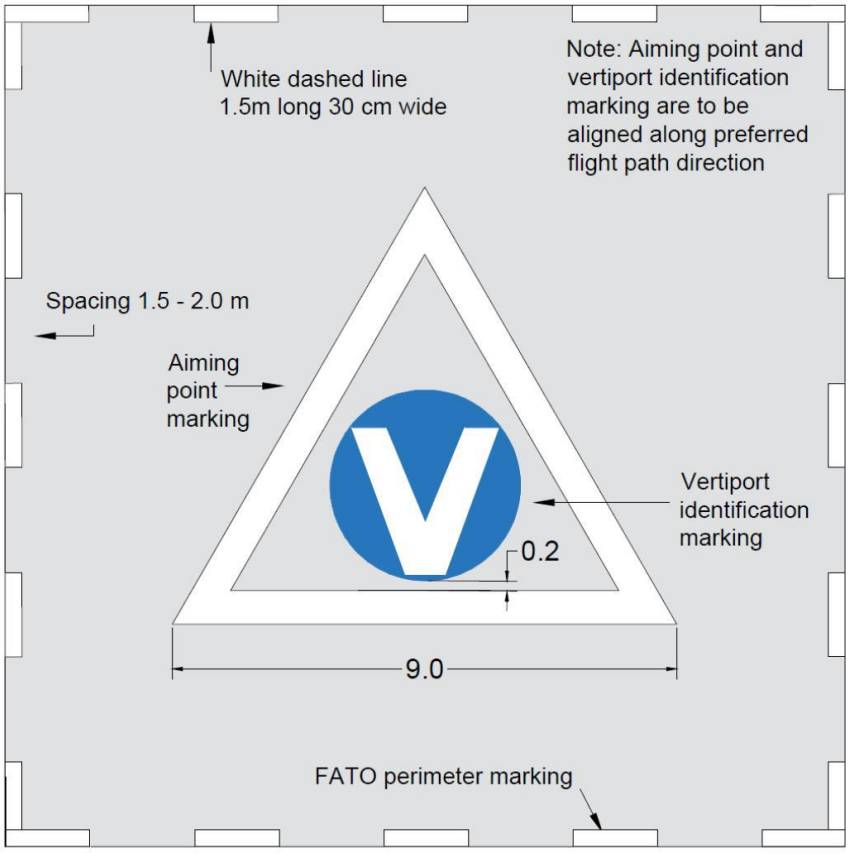


Figure-158: Example of VTOL-capable aircraft landing area markings



2. VFI Training Simulator

<u>Internal configuration</u>

(a) The cockpit (basic simulation of helicopter/VCA cockpit);

(b) A realistic baggage and freight compartment, including door or hatch and handle operational arrangements as found on onshore and offshore helicopters/VCAs; and

(c) Passenger seating arrangement as found in onshore and offshore helicopters/VCAs, to simulate seating arrangements for passengers

Helicopter/VCA Firefighting Simulator

(a) Helicopter/VCA Simulator Shape and Size

(1) Although the fire and emergency response simulator doesn't have to be an exact size and shape of a real helicopter for transporting passengers offshore, it should have a shape of a helicopter and reasonably realistic size. (See Figure-8 for an example of a helicopter simulator and Figure-9: Example of VTOL-capable aircraft simulator)

Figure-159: Example of a helicopter simulator

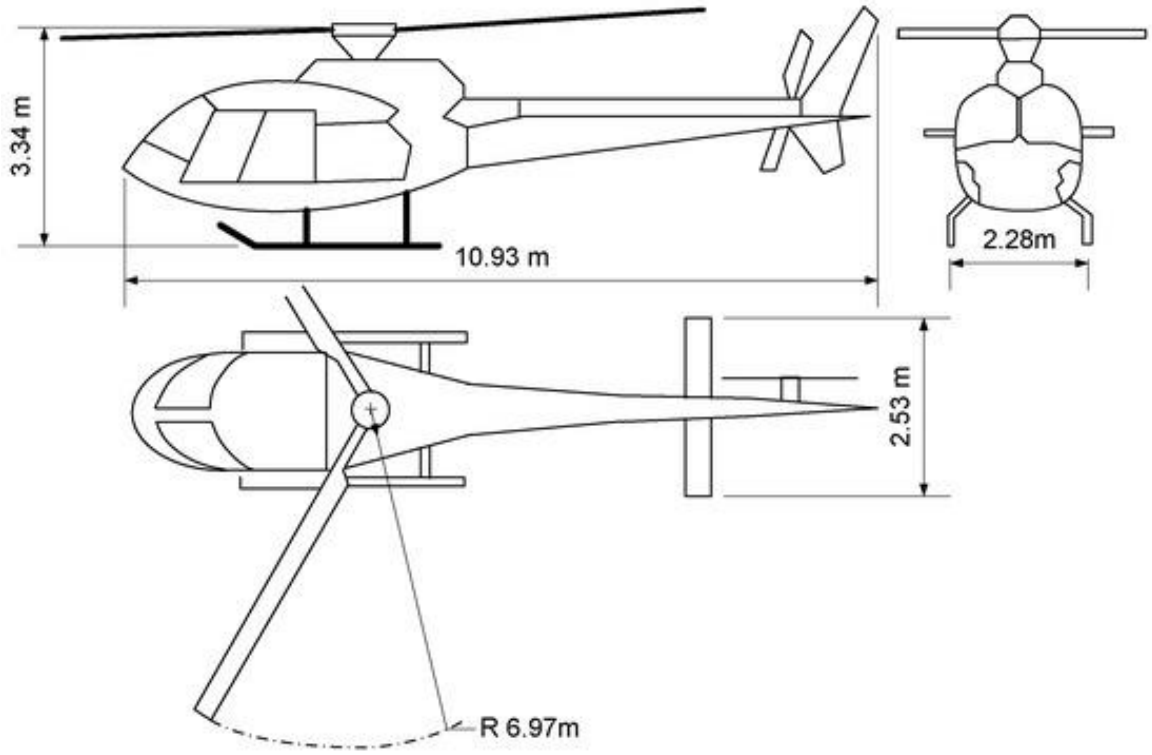
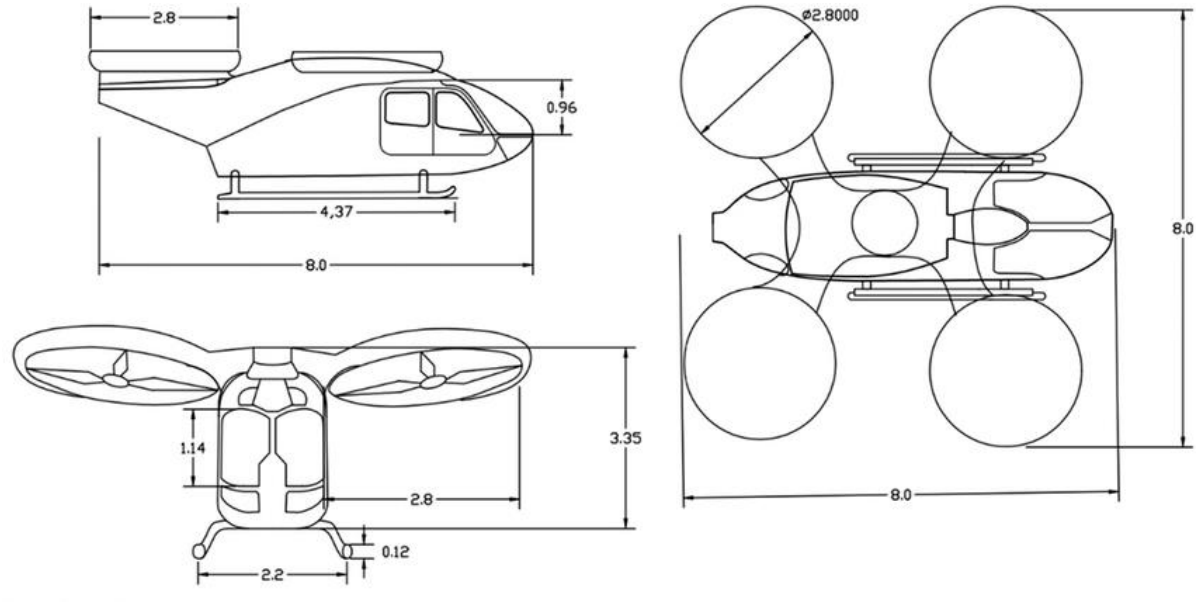


Figure-160: Example of VTOL-capable aircraft simulator



(b) The helicopter/VCA simulator should accommodate the following:

(1) search, rescue and retrieval of passenger casualty simulators by the RFF team using breathing apparatus

(2) facility for Classes A, B and C fires inside helicopter/VCA simulator

(3) passenger seating

(4) capable of being smoke-logged (Cosmetic smoke can be used during casualty extraction)

(5) window arrangement typical of a type used on an transport helicopter/VCA

(6) helicopter/VCA baggage hold

(7) capability/arrangement for RFF team to enter the helicopter/VCA simulator for helicopter/VCA crash on deck exercise i.e., fuselage top entry.

(8) facility to enable simulation from an overturned helicopter.

(9) facility to accommodate the extinguishing of a simulated engine fire by a CO2 or other gaseous extended applicator.

Firefighting

(a) Fire Classes

	Fire Scenario	**Fire Classification**
1	Fuel spill fire	Class B- flammable liquid
2	Leaking fuel fire	Class B- flammable liquid
3	Internal fires	Class A
4	Engine fire	Class B-flammable liquid OR Class C-flammable gas
5	Battery fire (thermal runway)	Class E- electric

Note 1. — Flammable liquid that has similar combustion characteristics of aviation fuel.

Note 2. — For environmental purposes, smoke suppression or clean-burn systems are acceptable for reducing smoke during Class A, B & C fire exercises.

(b) Firefighting Equipment

(1) Firewater Hydrants – for attaching fire hoses

(2) Hand adjustable foam-producing fire monitors capable of cross-arcing over the helideck

(3) Mobile foam and dry powder CO2 cart/trolley

(4) Portable extinguishers:

(i) Water

(ii) Dry powder

(iii) Foam

(iv) CO2

(5) Fire hoses

(6) Variety of branches: aspirated and non-aspirated

(7) Foam inductors

(8) CO2 extended applicator for extinguishing engine fires

(9) Water fire hose reel

(10) Fire-lighting equipment for lighting fires.

Firewater Reservoir Tank/Vessel

(a) Firewater pumping capacity adequate to supply practical fire exercise areas at full training capacity.

(b) Firewater pumping system back-up capability to supply adequate pressurised water to the exercise area in the event of the main pump/s failure.

(c) Adequate controls and safety arrangements to shut off fuel to fires in event of fire water failure.

(d) Low firewater pressure alarm.

3. Rescue equipment and personal protective clothing

Helicopter Crash Rescue equipment

(a) The provision of at least one set of helicopter crash rescue equipment is required in order to support firefighting and rescue activities (see rescue equipment list stated in PART HVD).





(b) The equipment should be easily accessed by the helideck / ER team, kept in complete and serviceable condition, and be ready for use in the vicinity of the training structure.

(c) The equipment stored in the Crash Box should cover the items recommended in applicable documentation in accordance with PART HVD.

(d) Medical and first aid equipment – sufficient types and quantities for the training

(e) Casualty manikins – various sizes and weights

(f) Protective clothing and respiratory equipment should be fit for purpose for RFF teams.

(g) Resuscitation equipment for training delegates.

4. Preventive maintenance

(a) Preventive maintenance programme for the training facilities including associated vehicles and equipment should be in accordance with OEM recommendations and/or other internationally-accepted standards.

AMC6 TRG.OR.F.005 Training provider — instructional equipment requirements

Training provider — Instructional equipment requirements

(a) Each classroom should have appropriate presentation equipment of a standard that ensures students can easily read presentation text/drawings/diagrams and figures from any position in the classroom. Presentation equipment shall include representative synthetic training devices to assist students in their understanding of the particular subject matter where such devices are considered beneficial for such purposes.

(b) Training facilities should have all tools and equipment necessary to perform the accepted scope of training. Training facilities should, at least, include physical & virtual simulators, personal protective equipment, aerodrome rescue and firefighting equipment, respiratory protection, smoke chambers, firefighting simulators. Additional tools and equipment should be added where relevant.

(c) Practical training facilities should have appropriate selection of aircraft simulations including fuselage, engines, cabin parts, rotary components and avionics equipment at both dry and wet practical training areas. All students should be provided with appropriate personal protective equipment for all practical trainings. Where training involves working in smoke environment, respiratory protective equipment (breathing apparatus) should be provided to all students. Appropriate safety briefing should be conducted before each practical training including use of PPE and/or RPE.

(d) A preventive maintenance programme should be established and implemented for all instructional equipment.

AMC7 TRG.OR.F.005 Training provider — training materials requirements

Training provider — Training materials requirements

(a) Training course material should be provided to all students, which, at least, include:

(1) a training syllabus consisting of a full training programme, lesson plan, instructor guide, student notes, assessment, presentation materials; and

(2) type of course content for each structured learning programme.

(b) Training course notes, diagrams and any other instructional material should be accurate.

(c) Student Records

(1) The training provider should keep all records including student training, examination and assessment records for a minimum of 5 years.

(d) Safety and quality management systems

(1) The training provider should establish sufficient procedures acceptable to the GCAA to ensure proper training standards and compliance with all relevant requirements.

(2) The training provider should establish management systems which, at least, contain:

(i) safety and quality management procedures;

(ii) implementation of a management of change of the full training processes;

(iii) an independent audit function to monitor training standards, the integrity of knowledge examinations and practical assessments, compliance with and adequacy of the procedures;

(iv) evaluation of training effectiveness e.g. course evaluation, customer engagement, industry visit, etc; and

(v) a feedback system of audit findings to the person(s) and ultimately to the accountable manager to ensure, as necessary, corrective and preventive actions

(e) The independent audit procedure should ensure that all aspects of compliance are checked at least annually and may be carried out as one complete single exercise or subdivided over a 12-month period in accordance with a scheduled plan.

(f) Where the training provider is also accepted to conduct training based on another GCAA regulation requiring a quality management system, then such system may be combined.

(g) Where training activities and/or services are sub-contracted to a third-party organisation:

(1) a pre-audit procedure should be established whereby the training organisation should audit a prospective sub-contractor to determine whether the services of the sub-contractor meet the intent of this regulation;

(2) an internal audit of the subcontractor should be performed at least once every 12 months to ensure continuous compliance with this regulation; and

(3) the sub-contract control procedure should record audits of the sub-contractor and to have a corrective action follow-up plan.

(h) An independence of the audit system should be established by always ensuring that audits are carried out by personnel not responsible for the function or procedure being checked.

AMC8 TRG.OR.F.005 Training provider — training delivery requirements

Training provider — Training delivery requirements

(a) The training provider should ensure all students meet the necessary training pre-requisites requirements. Where practical training is involved, the fitness status of the students should be verified by the organisation.

(1) If the fitness status of a student is in doubt, he/she should be removed from the training course to seek the advice of a qualified occupational medical person to confirm the suitability of the student to continue with the training. Where in doubt, students should submit a fit for duty declaration form.

(2) Certain practical trainings may require above average fitness levels. Training organisations should determine the appropriate fitness levels for different practical trainings.

(b) Training facilities should be regularly checked prior to the delivery of the training course. Where practical training is involved, a safety inspection should be conducted around the training area. Safety briefing including walk around may be necessary to familiarise students with the training area, facility and equipment.

(c) Safe management procedures should be implemented including use of personal protective equipment, health and safety arrangements, where practical training involves:

(1) the use of flammable liquids, liquefied gases or alternative fuels including determination of safe allowable quantity and exposure limit;

(2) working at height;

(3) working in confined spaces;

(4) working in smoke;

(5) manual handling; and

(6) working in heat and humidity.

(d) The training provider should ensure the validity and security of the overall training system including:

(1) knowledge examinations and practical assessment can either be computerised or hard copy or a combination of both; and

(2) the methodologies to be used in a particular examination and assessment are determined by the assessors

AMC9 TRG.OR.F.005 Training provider — continued validity

Training provider — continued validity

(a) The training provider should deliver the training courses in accordance with the accepted training and proficiency checks programmes.

(b) The GCAA may restrict where their training providers may train and what training programmes are acceptable for gaining or maintaining the conditions attached to the certificate that they are issued with.

RENEWAL OF THE Acceptance

(a) The acceptance issued by the GCAA remains valid as long as the conditions under which the acceptance has been granted are fulfilled. Appropriate surveillance by the GCAA will be conducted in order to ensure that the training provider continues to meet the training provider requirements set by the GCAA.

CHANGES IN THE SCOPE OF THE ACCEPTANCE

(a) Aerodrome rescue and firefighting training is a dynamic activity, and it is likely that training provider will ask regularly for a change in the scope of their acceptance; for instance, they may want to provide new training or change a training programme to take advantage of new training equipment or facilities. In such a case, the training provider should provide supporting information to the GCAA that will assess it using the applicable requirements in this

Regulation, its requirements and the relevant parts of this guidance material. An amendment to the acceptance document should be issued by the GCAA after a satisfactory assessment.

(b) Changes or modifications in equipment, software, facilities or key personnel should be reported to the GCAA, in writing, to ensure that any required acceptances are obtained without delay.

CONTINUED SURVEILLANCE AFTER THE ACCEPTANCE

(a) After receiving an acceptance, the training provider will be subjected to continued surveillance by the GCAA to ensure that the training provider is operating within the terms of its acceptance and as described in its training and procedures manual.

(b) The acceptance may be suspended, curtailed or revoked should any audit and inspection by the GCAA revealed that serious findings affecting the safe and effective delivery of the training programme. Significant changes to training programme syllabi, personnel, facilities and resources should be agreed with the GCAA prior to implementation.

(c) The GCAA reserves the right to review the syllabus content and practical trainings, as and when required.

AMC10 TRG.OR.F.005 Training provider — documentation requirements

documentation requirements

1. training and competency manual

(a) The training provider should develop a training and competency manual describing the training and proficiency checks programme being offered and the way in which the training provider conducts its activities. It is an essential document for the training provider because it provides the management and line personnel with clear guidance on the policy of the training provider as well as the procedures and processes which are used to provide training. It is also an essential document for the GCAA. During the acceptance process, it allows the GCAA to assess whether the way in which a training provider is planning to operate is in line with existing requirements and accepted practices. Once the training provider is accepted, a large part of the surveillance activities of the GCAA is to ensure that the training provider is following the training and procedures manual.

(b) It is important that the contents of the training and competency manual be consistent with other operational documents, regulations and manufacturer's requirements. The manual should also be user-friendly. It is also necessary to ensure that the manual is used consistently

across all Departments within the training provider. This can be achieved through an integrated approach that recognizes operational documents as a complete system.

(c) This chapter explains how the training and competency manual should be developed, implemented and managed.

2. DOCUMENTATION MANAGEMENT

(a) The training and competency manual should be issued in separate parts if the training provider find it too cumbersome to have all the required content appear in a single document. It also mandates that these documents be maintained to ensure their continued relevancy and compliance with applicable regulations.

(b) An effective quality system requires robust policies, processes and procedures for documentation management and record keeping. Since shortcomings in documentation management eventually lead to poor standardization and a diminished quality of training, training provider should be vigilant of weaknesses in this area by including it in their internal assurance programme.

3. CONTENT

(a) The content of the training and competency manual should provide a more detailed breakdown of the content of the manual and includes additional requirements for training provider that are engaged in aerodrome rescue and firefighting training. Depending on the size, complexity and scope of the training provided by the training provider, some of the elements contained in the list can be reduced, combined or expanded further.

4. structure of manual

(a) The training and competency manual should be organized according to criteria relating to the information, its importance and use. The information should be structured and sequenced so that operational personnel can access it easily. This principle will help determine whether to issue the manual as a single document or in separate parts. When the training and competency manual is organized into separate parts, it should include a master index to help users locate information included in more than one part. The master index should be placed in the front of each part.

(b) The manual should describe accurately the training provider’s policies, processes and procedures.

(c) The structure of the manual should be easy to understand, appropriate for the information and clearly identified through headings and other formatting devices. An explanation of the

manual elements such as the headings, numbering scheme, main parts of the document and other sources of coding or groupings should be provided at the beginning of the manual.

(d) Precise language should be used wherever possible. Terms for common items and actions should be consistent throughout the manual and should be clear and easily understood.

(e) Writing style, terminology, formatting and use of graphics and symbols should be consistent throughout the document, including the location of specific types of information and use of units of measurement and codes.

(f) The manual should contain a glossary of definitions and significant terms including a list of acronyms and/or abbreviations. The glossary should be updated on a regular basis to ensure access to the most recent terminology.

(g) For ease of amendment and distribution, an appropriate revision process should be defined and established when designing the manual.

(h) The training and competency manual should comply with the requirements of the training provider's quality assurance practices.

5. VALIDATION

(a) The training and competency manual should be reviewed and tested under realistic conditions before its operational release. The validation process should include using the critical aspects of the information contained in the manual to verify its effectiveness. Routine interaction among groups within the training provider should be included in the validation process.

(b) A final review of the manual should ensure that all required topics have been addressed with an appropriate level of detail for users. The final review should also confirm compliance with safety regulations, manufacturers' recommendations and the training provider's policies, procedures and processes.

6. DEPLOYMENT AND FEEDBACK

(a) The training provider should maintain and update as necessary the training and competency manual after its initial release. This will ensure appropriate and realistic use of the manual, based on the current operational environment, in a way that is operationally relevant and appropriate for the users for whom it is intended.

(b) In order to gather information for updates of the manual, a formal feedback system should be established to obtain input from principal users and others who would be affected by a new or revised policy, procedure or process.

7. AMENDMENT

(a) The training provider should develop an effective information gathering and review system to process information obtained from all sources relevant to the provider, such as the GCAA, safety regulators, training clients, manufacturers and equipment vendors, as well as a distribution and revision control system.

Note. — Manufacturers provide information on the operation, handling and maintenance of specific equipment, vehicles and components thereof, which emphasizes the equipment or systems and procedures under conditions that may not fully match the requirements of the training provider. Training providers should ensure that such information meets their specific needs and those of the GCAA.

(b) The training provider should also develop an information review, distribution and revision control system to process information resulting from changes that originate within the training provider. This includes changes to:

(1) the training provider's policies, processes, procedures and practices;

(2) respond to operating experience;

(3) the scope of training provided;

(4) the content of training programmes;

(5) results stemming from the installation of new equipment;

(6) an acceptance document or certificate requested by the training provider and issued by the GCAA; and

(7) maintain standardization of training delivery and performance criteria.

(c) The manual should be reviewed in association with other operational documents that form the training provider's document control system:

(1) on a regular basis (at least once a year);

(2) after major events such as mergers, acquisitions, rapid growth or downsizing;

(3) after technology changes, e.g. the introduction of new equipment;

(4) after changes to safety regulations;

(5) after changes to key operational personnel (e.g. Head of Training); and

(6) after changes to the scope of training provided.

(d) Permanent changes to the training and competency manual should be communicated through a formal amendment process.

(e) Distribution of amendments and revisions should have a tracking system. The tracking system should include some form of log combined with a procedure to ensure that all amendments are furnished promptly to all providers or persons to whom the manual has been issued.

AMC11 TRG.OR.F.005 Training provider — quality assurance

quality assurance

Note 1. — The objective of quality assurance (QA) is to ensure the achievement of results that conform to the standards set out in the training provider's manuals and in requirements and documents issued by the GCAA. The effective application of QA principles will aid the training provider in meeting all regulatory requirements.

Note 2. — Quality is an outcome of a number of processes: establishing standards; planning activities and documenting procedures to support such activities and standards; training the personnel involved before implementing the documented procedures; and measuring the outcomes of the activities to ensure that they meet the standards and expected results. If any non-conformities are found, corrective actions are taken to improve processes and procedures.

Note 3. — It is to be emphasized that, to be truly effective in delivering the very best possible products and services, training providers need to implement proactive as well as reactive processes.

Note 4. — The instructions and information contained in the following paragraphs provide guidance on the QA that each training provider needs to establish.

1. ELEMENTS of quality assurance

(a) The following QA elements should be clearly identifiable in the training and competency manual:

(1) the training provider's training policy (for its own personnel and others);

(2) training standards;

(3) allocation of responsibility;

(4) resources, provider and operational processes;

(5) procedures to ensure conformity of training with the training policy;

(6) procedures for identifying deviations from training policy and standards, and for taking corrective action, as necessary; and

(7) the evaluation and analysis of experiences and trends concerning policy and training standards, in order to provide feedback into the system for the continual improvement of the quality of training.

2. QUALITY ASSURANCE AND THE QUALITY SYSTEM OF THE training provider

(1) FACILITIES

(a) A training provider should provide facilities appropriate to the size and scope of the intended operations provided in an environment conducive to learning. These facilities should include:

(1) general areas which consist of sufficient:

(i) office space for training provider's managerial, administrative and training staff;

(ii) study and examination rooms and reference/library facilities; and

(iii) storage areas, including secure areas for training and personnel records;

(2) classroom areas which are suitably equipped to effectively deliver the theoretical elements of the training programme in accordance with the training and procedures manual; and

(3) practical training areas which are designed and equipped to ensure the attainment of end-state competencies. These facilities should include, whenever applicable:

(i) operations, planning and briefing rooms;

(ii) simulation and training areas;

(iii) trainees changing and rest areas;

(iv) workshop and maintenance facilities; and

(v) equipment storage areas.

(2) TRAINING COURSEWARE AND EQUIPMENT

(a) A training provider should ensure that all courseware and equipment required by the training programme, as specified in the training and competency manual, are available and in good working order.

(b) Changes to working conditions and any temporary “work-around” solutions should be discussed prior to continuing with the scheduled training.

(3) ACCEPTANCE OF TRAINING FACILITIES AND DEVICES

(a) With the rapid improvements in technology, an increasing number of simulation training devices for training personnel within the aviation industry are entering the marketplace. Some training programmes even use web-based simulation to such an extent that full accreditation for successful programme completion is achieved without the trainees ever having to leave their normal place of work or, in some cases, their residence.

(b) Each training device that is intended for training, testing or checking in an accepted training programme and for which credit is being sought needs to be made available to the applicable Authority, prior to initial use, for determination of its suitability.

(c) In addition to meeting the obligations of national regulations, the training provider should implement at least the following for all training devices:

(1) a routine maintenance programme to ensure that the training devices continue to function properly and, when applicable, continue to accurately replicate any component, system or equipment for which training, checking or testing credits are being sought; and

(2) a record-keeping process for each training device to be established and maintained, which accurately records the device's use and lists any discrepancies with respect to its functionality or intended performance characteristics that may impact training.

AMC12 TRG.OR.F.005 Training provider — third party

Training provider — third party provider

1. COURSEWARE

(a) As training programme design becomes more sophisticated, training providers may consider engaging outside assistance - third party provider in the development of courseware. This is particularly true with competency-based programmes that require a relatively short-term increase in manpower during the development phase.

(b) Whether or not a training provider engages outside assistance in designing and providing courseware, the training provider should be accountable for the quality and suitability of its courseware. The work being performed by the third-party provider should therefore be subjected to the same quality assurance (QA) practices that the training provider is expected to apply to its own work.

2. FACILITIES AND EQUIPMENT

(a) Frequently the aviation training industry runs in cycles, during which training providers may be operating below capacity for long periods of time only to suddenly find themselves inundated by demands that exceed their ability to deliver. A training provider may also need equipment for some parts of the training which may not be economically viable to own. To mitigate the impact of not being able to effectively respond and thus potentially lose valued clients, training providers frequently have standing agreements with other institutions to lease facilities and equipment.

(b) The temporary use of another provider's facilities and equipment can present challenges in terms of the QA processes of the training providers. Under these circumstances, a breakdown in vigilance can cause serious damage to the integrity and quality of the training. To mitigate this, training providers should develop contingency plans in their quality manual for instances when training levels are such that the use of another institution's facilities and equipment is required.

3. PERSONNEL

(a) The most frequent outsourcing practice of training providers is the hiring of temporary instructional personnel. It is during these times in particular that a robust quality system will protect the integrity and quality of an training provider's training programmes and the training provider's reputation for delivering quality products and services.

(b) Despite their best intentions and qualifications, temporary employees elevate the risk of non-standardized delivery of training and of a decrease in the level of service provided to the training provider's clients. Detailed, documented policies, processes and procedures that are easy to understand and uniformly applied, combined with initial indoctrination training, will go a long way to mitigating this risk.

(c) Besides training its regular staff, training providers should ensure that refresher training is implemented on a scheduled basis for part-time or temporary instructional personnel prior to commencing their duties after a specified period of inactivity. Re-familiarization with the training providers' quality system and expected levels of service should be included in this training scheme. Besides the contingency plan, the training provider's quality manual should include policies, processes and procedures for the employment of temporary instructional staff.

4. RECORD KEEPING

(a) Keeping accurate and complete training records is an important aspect of complying with the acceptance requirements. It is also an essential tool for the training providers to ensure the continuity and consistency of its training. The qualifications required for training personnel and trainees should be recorded in the record-keeping system to ensure that those qualifications are monitored and current.

(b) The record-keeping system of an training provider should have the following characteristics:

(1) Completeness. The records kept by the ATO should be sufficient to provide documentary evidence of each training action and allow the reconstruction of the training history of each student or instructor in the TRAINING PROVIDER;

(2) Integrity. It is important to maintain the integrity of records, ensuring that they are not removed or altered. A backup of the records is also necessary to ensure continuity in case of a major disaster; and

(3) Accessibility. Records of both instructional personnel and trainees should be readily accessible.

(c) Each training provider should also establish rules for archiving personal employment and training records that are non-active.

(d) Training records should be archived for at least 5 years.

AMC13 TRG.OR.F.005 Training provider — oversight activities

oversight activities

(a) Oversight activities by the GCAA consist of the acceptance process of the training provider and the continued surveillance of the training provider's training delivery after acceptance. The purpose of the surveillance activities is to ensure that the training provider is operating within the terms of its acceptance and as described in the training and competency manual.

(b) The GCAA's oversight activities include a review of the training provider's quality assurance (QA) system, its administrative, technical and training records and its operational activities. Surveillance is an ongoing function that may also include consideration of records held by the GCAA, for example, practical test and examination results, in addition to on-site inspections, audits and other surveillance activities.

(c) The main elements of the training provider activities that are subject to the GCAA's oversight include, as applicable, the following:

(1) staff adequacy in terms of number and qualifications;

(2) validity of assessors' and instructors' certificates and authorizations;

(3) logbooks;

(4) appropriate and adequate facilities for the training and for the number of students;

(5) documentation process (e.g., the review and update of the training and competency manual), with particular emphasis on course documentation, including records of updates, training/operations manuals, etc.;

(6) training delivery in the classroom and in simulation devices and, if applicable, instruction or on the-job training, including briefing and de-briefing;

(7) instructor and assessor training;

(8) QA practices;

(9) safety management functionality;

(10) training, examination and assessment records;

(11) evaluation and checking;

(12) equipment serviceability;

(13) maintenance records; and

(14) training device qualification and acceptance.

AMC14 TRG.OR.F.005 Training provider — overseas acceptance and oversight activities

Overseas acceptance and oversight activities

(a) For the acceptance and oversight activities of the training provider located outside of the United Arab Emirates, the training provider should:

(1) bear all travel, accommodation and other miscellaneous costs in accordance with GCAA per diem policies and procedures, if the training provider including its associated facilities is located outside the United Arab Emirates; and

(2) ensure initial acceptance and continued regulatory oversight activities e.g., audits and inspections by the GCAA include all contracted services and/or activities.